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Cleaning Device

Abstract

The present disclosure provides a cleaning device, including a cleaning device body provided with an accommodating groove and an accommodating opening, an adjustment mechanism, a moving mechanism, a main cleaning mechanism including at least one filtering box which is provided with a debris inlet and assembled to the accommodating groove through the accommodating opening, a handle, a roller brush, and a solar mechanism including a solar panel. Along a forward direction, a ratio of a maximum length of the solar panel to a maximum length of a contour of the cleaning device body is greater than or equal to 0.7 and less than 1. Along a direction perpendicular to the forward direction, a ratio of a maximum width of the solar panel to a maximum width of the contour of the cleaning device body is greater than or equal to 0.5 and less than 1.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] The present disclosure is a continuation-in-part of prior U.S. patent application Ser. No. 19/031,442, filed on Jan. 18, 2025, which is a continuation-in-part of prior International Patent Application No. PCT/CN2024/094025, filed on May 17, 2024, which claims priority to: Chinese Patent Application No. 202311639354.6, filed with the China National Intellectual Property Administration on Dec. 1, 2023 and entitled “POOL CLEANING ROBOT”, Chinese Patent Application No. 202410070430.4, filed with the China National Intellectual Property Administration on Jan. 17, 2024 and entitled “POOL ROBOT AND CONTROL METHOD THEREOF, AND STORAGE MEDIUM”, and Chinese Patent Application No. 202410362217.0, filed with the China National Intellectual Property Administration on Mar. 27, 2024 and entitled “POOL CLEANING ROBOT”, all of which are hereby incorporated by reference herein.

TECHNICAL FIELD
[0002] The present disclosure relates to the technical field of operating devices for liquid, and in particular to, a cleaning device.
BACKGROUND
[0003] A swimming pool robot may clean debris in a pool, such as an object floating on a water surface or stains in the water. An existing swimming pool robot includes at least one filtering box and a solar panel. The filtering box is disposed in the swimming pool robot. The filtering box is configured to filter and accumulate the debris, such as the object floating on the water surface or the stains in the water. The solar panel is disposed on the top of the swimming pool robot. When the debris in the filtering box needs to be dumped, a user opens a top cover and removes the filtering box from the pool robot to dump the debris. However, in a process of repeatedly opening the top cover of the swimming pool robot, the solar panel is also opened repeatedly with the top cover. Consequently, it is prone to damage the solar panel, thereby affecting a service life of the solar panel.
SUMMARY OF THE DISCLOSURE
[0004] The present disclosure provides a cleaning device, including: a cleaning device body, including an outer side portion; at least one accommodating opening and at least one accommodating groove, where the accommodating opening is provided at the outer side portion, the accommodating groove is provided on the cleaning device body, and the accommodating opening communicates with the accommodating groove; an adjustment mechanism, including at least one buoyancy cavity, where the buoyancy cavity is provided in the cleaning device body and configured to adjust the cleaning device body to be at least partially located on a water surface; a moving mechanism, disposed at the cleaning device body and configured to drive the cleaning device body to move; a main cleaning mechanism, including at least one filtering box, where the

filtering box is provided with a debris inlet, at least partially accommodated in the accommodating groove, and capable of being assembled to the accommodating groove in a pull-out manner through the accommodating opening, and a direction of pulling out the filtering box includes a direction substantially parallel to a forward direction of the cleaning device; a handle, disposed at a periphery of the filtering box; a roller brush, rotatably disposed at the debris inlet, where the handle and the roller brush are located on a same side of the cleaning device body; and a solar mechanism, including a solar panel disposed on a top surface of the cleaning device body. A maximum length of a contour of the cleaning device body along the forward direction is a first length. A maximum width of the contour of the cleaning device body along a direction perpendicular to the forward direction is a first width. A maximum length of the solar panel along the forward direction is a second length. A maximum width of the solar panel along the direction perpendicular to the forward direction is a second width. A ratio of the second length to the first length is greater than or equal to 0.7 and less than 1. A ratio of the second width to the first width is greater than or equal to 0.5 and less than 1.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] To more clearly describe the technical solutions in embodiments of the present disclosure, the following briefly introduces the accompanying drawings required for describing embodiments. It is clear that the accompanying drawings in the following description show merely some embodiments of the present disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

[0006] FIG. **1** is a first partial schematic view of a cleaning device according to a first embodiment of the present disclosure;

[0007] FIG. **2** is a first cross-sectional view of a cleaning device according to a first embodiment of the present disclosure;

[0008] FIG. **3** is a partial side view of a cleaning device according to a first embodiment of the present disclosure;

[0009] FIG. **4** is a first schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0010] FIG. **5** is a second schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0011] FIG. **6** is an enlarged schematic view of a portion B shown in FIG. **5**;

[0012] FIG. **7** is a third schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0013] FIG. **8** is a fourth schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0014] FIG. **9** is a fifth schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0015] FIG. **10** is a sixth schematic structural view of a cleaning device according to a second embodiment of the present disclosure;

[0016] FIG. **11** is a second partial schematic view of a cleaning device according to a first embodiment of the present disclosure;

[0017] FIG. **12** is a partial exploded schematic view of the cleaning device shown in FIG. **11**;

[0018] FIG. **13** is a second cross-sectional view of a cleaning device according to a first embodiment of the present disclosure;

[0019] FIG. **14** is a schematic structural view of a portion C shown in FIG. **13**;

[0020] FIG. **15** is a schematic structural view of a cleaning device according to a third embodiment

of the present disclosure;
[0021] FIG. **16** is a first partial schematic view of a cleaning device according to a third embodiment of the present disclosure;
[0022] FIG. **17** is a second partial schematic view of a cleaning device according to a third embodiment of the present disclosure;
[0023] FIG. **18** is a schematic structural view of a first transmission mechanism according to the present disclosure;
[0024] FIG. **19** is a simplified schematic structural view of a cleaning device according to a fourth embodiment of the present disclosure;
[0025] FIG. **20** is a schematic three-dimensional structural view of a cleaning device according to a fifth embodiment of the present disclosure;
[0026] FIG. **21** is a schematic three-dimensional structural view of a cleaning device according to a sixth embodiment of the present disclosure;
[0027] FIG. **22** is a schematic structural view of the bottom of the cleaning device according to a sixth embodiment of the present disclosure;
[0028] FIG. **23** is a schematic structural view of a spout at a second position according to a fifth embodiment of the present disclosure;
[0029] FIG. **24** is a schematic structural view of a spout at a first position according to a fifth embodiment of the present disclosure;
[0030] FIG. **25** is a first schematic structural view of a filtering box of a cleaning device according to the present disclosure;
[0031] FIG. **26** is a schematic structural view of a portion A shown in FIG. **2**;
[0032] FIG. **27** is a first schematic structural view of a locking mechanism of a cleaning device according to the present disclosure;
[0033] FIG. **28** is a first partial cross-sectional view of a locking mechanism of a cleaning device according to the present disclosure;
[0034] FIG. **29** is a schematic structural view of a portion D shown in FIG. **25**;
[0035] FIG. **30***a* is a second schematic structural view of a filtering box of a cleaning device according to the present disclosure;
[0036] FIG. **30***b* is a third schematic structural view of a filtering box of a cleaning device according to the present disclosure;
[0037] FIG. **30***c* is a schematic structural view of a side brush of a cleaning device according to the present disclosure;
[0038] FIG. **31** is a schematic structural view of a portion E shown in FIG. **30***a;*
[0039] FIG. **32** is a simplified schematic structural view of an anti-regurgitation assembly according to an embodiment of the present disclosure;
[0040] FIG. **33** is a simplified schematic structural view of an anti-regurgitation assembly according to another embodiment of the present disclosure;
[0041] FIG. **34** is a simplified schematic structural view of an anti-regurgitation assembly according to still another embodiment of the present disclosure;
[0042] FIG. **35** is a schematic structural view of a side brush drive motor according to the present disclosure;
[0043] FIG. **36***a* is a first side view of a cleaning device according to a first embodiment of the present disclosure;
[0044] FIG. **36***b* is a second side view of a cleaning device according to a first embodiment of the present disclosure;
[0045] FIG. **37** is a schematic structural view of a cleaning device according to a first embodiment of the present disclosure;
[0046] FIG. **38***a* is a schematic structural view of a cleaning device according to a seventh embodiment of the present disclosure;

[0047] FIG. **38***b* is a schematic structural view of a cleaning device according to an eighth embodiment of the present disclosure;
[0048] FIG. **39** is a schematic structural view of a portion F shown in FIG. **38***a;*
[0049] FIG. **40** is a schematic structural view of a portion G shown in FIG. **38***a;*
[0050] FIG. **41***a* is a schematic structural view of an anti-stranding assembly of a cleaning device according to a first embodiment of the present disclosure;
[0051] FIG. **41***b* is an exploded view of an anti-stranding assembly of a cleaning device according to a first embodiment of the present disclosure;
[0052] FIG. **42***a* is a first schematic cross-sectional view of a cleaning device according to a ninth embodiment of the present disclosure;
[0053] FIG. **42***b* is a partial cross-sectional view of a cleaning device according to a ninth embodiment of the present disclosure;
[0054] FIG. **43***a* is a schematic structural view of a second pressing part of a cleaning device according to the present disclosure;
[0055] FIG. **43***b* is a first partial exploded view of a cleaning device according to a ninth embodiment of the present disclosure;
[0056] FIG. **43***c* is a first partial structural view of a cleaning device according to a ninth embodiment of the present disclosure;
[0057] FIG. **43***d* is a second partial structural view of a cleaning device according to a ninth embodiment of the present disclosure;
[0058] FIG. **43***e* is a third partial structural view of a cleaning device according to a ninth embodiment of the present disclosure;
[0059] FIG. **43***f* is a second partial exploded view of a cleaning device according to a ninth embodiment of the present disclosure;
[0060] FIG. **44***a* is a fourth schematic structural view of a filtering box of a cleaning device according to the present disclosure;
[0061] FIG. **44***b* is a fifth schematic structural view of a filtering box of a cleaning device according to the present disclosure;
[0062] FIG. **45***a* is a schematic structural view of a filtering box of a cleaning device according to an embodiment of the present disclosure;
[0063] FIG. **45***b* is a schematic structural view of a filtering box of a cleaning device according to an embodiment of the present disclosure;
[0064] FIG. **45***c* is a partial cross-sectional view of a cleaning device according to an embodiment of the present disclosure;
[0065] FIG. **46** is a schematic structural view of an anti-regurgitation door according to an embodiment of the present disclosure;
[0066] FIG. **47***a* is a schematic structural view of a filtering box of a cleaning device according to an embodiment of the present disclosure;
[0067] FIG. **47***b* is a schematic structural view of a filtering box of a cleaning device according to an embodiment of the present disclosure;
[0068] FIG. **47***c* is a partial cross-sectional view of a cleaning device according to an embodiment of the present disclosure;
[0069] FIG. **48** is a schematic structural view of a wireless charging interface and a wireless charging connector according to an embodiment of the present disclosure;
[0070] FIG. **49***a* is a partial structural view of a cleaning device according to an embodiment of the present disclosure;
[0071] FIG. **49***b* is a partial structural view of a cleaning device according to an embodiment of the present disclosure;
[0072] FIG. **50***a* is a partial structural view of a cleaning device according to an embodiment of the present disclosure; and

[0073] FIG. **50***b* is a partial structural view of a cleaning device according to an embodiment of the present disclosure.

[0074] Reference numerals in drawings: **1000**: cleaning device; **100**: cleaning device body; **1011**: first side portion; **1012**: second side portion; **1013**: third side portion; **1014**: fourth side portion; **102**: accommodating opening; **104**: water blocking structure; **107**: top cover; **108**: accommodating groove; **109**: auxiliary mounting groove; **110**: auxiliary mounting portion; **111**: first anti-collision part; **112**: second anti-collision part; **113**: extension mechanism; **114**: third anti-collision part; **120**: wireless charging interface; **130**: drive box; **140**: anti-stranding assembly; **1401**: anti-stranding wheel; **141**: anti-stranding housing; **142**: anti-stranding part; **1421**: manual portion; **143**: pressed elastic portion; **200**: adjustment mechanism; **210**: buoyancy cavity; **211**: first buoyancy cavity; **212**: second buoyancy cavity; **213**: anti-collision groove; **214**: propulsion groove; **220**: buoyancy cavity pump; **300**: moving mechanism; **310**: propeller; **3101**: water flow channel; **3102**: opening; **320**: overwater sensor; **330**: underwater sensor; **400**: main cleaning mechanism; **410**: filtering box; **411**: filtering box portion; **412**: rotating portion; **413**: debris inlet; **4131**: first edge; **4132**: second edge; **4133**: gradually expanding structure; **414**: handle; **415**: first rotating shaft; **420**: locking mechanism; **421**: locking assembly; **4211**: first locking part; **42111**: first locking portion; **4212**: first elastic part; **4213**: first pressing part; **42131**: pressing bevel; **42132**: first pressing guide post; **42133**: pressing buckle; **4214**: second locking part; **42141**: second locking portion; **422**: locking groove; **4221**: first position-limiting structure; **4222**: second position-limiting structure; **4223**: third position-limiting structure; **423**: second pressing part; **4231**: second pressing guide post; **4232**: pressing mating portion; **4233**: pressing fixing part; **4234**: second elastic part; **4235**: anti-slip portion; **424**: first transferring structure; **4241**: first transferring end; **4242**: second transferring end; **425**: second transferring structure; **4251**: third elastic part; **4252**: third transferring end; **430**: sliding structure; **431**: sliding rail; **440**: positioning structure; **441**: positioning hole; **450**: roller brush; **4501**: roller brush blade; **4502**: roller brush base; **4503**: roller brush gear assembly; **460**: clamping structure; **461**: clamping groove; **462**: clamping block; **470**: anti-regurgitation assembly; **471**: anti-regurgitation door; **4711**: anti-regurgitation gear assembly; **4712**: second rotating shaft; **4713**: first reinforcing part; **472**: first anti-regurgitation portion; **473**: anti-regurgitation plate; **474**: second anti-regurgitation portion; **475**: first anti-jamming structure; **4751**: first anti-jamming sub-structure; **4752**: second anti-jamming sub-structure; **476**: second anti-jamming structure; **4761**: third anti-jamming sub-structure; **4762**: fourth anti-jamming sub-structure; **477**: third anti-jamming structure; **500**: auxiliary cleaning mechanism; **510**: first auxiliary cleaning assembly; **511**: side brush; **5111**: cleaning portion; **51111**: cleaning surface; **5112**: side brush body; **512**: rotation shaft; **513**: hub; **5131**: first hub; **5132**: second hub; **5133**: shaft sleeve; **514**: barrier wall structure; **5141**: first barrier wall portion; **520**: second auxiliary cleaning assembly; **521**: water spray assembly; **5211**: spout; **5212**: water spray part; **530**: connection portion; **531**: fixed portion; **532**: telescopic part; **541**: oscillating gear; **542**: worm gear; **543**: worm; **544**: transmission gear; **550**: auxiliary drive assembly; **551**: drive housing; **5511**: first drive housing; **5512**: second drive housing; **55121**: sealing portion; **552**: side brush drive motor; **553**: first sealing part; **554**: second sealing part; **555**: motor fixing part; **561**: grating disk; **562**: grating sensor, **600**: solar mechanism; **810**: water quality treatment assembly; **811**: reagent kit; **1**: reference plane; **2**: first direction shaft; **3**: second direction shaft; **2000**: wireless charging connector; **2001**: adapter; **2002**: second reinforcing part; **900**: light-emitting structure; **901**: light-emitting part; **902**: light transmission part; **903**: light guiding part.

DETAILED DESCRIPTION

[0075] The following clearly and completely describes the technical solutions in embodiments of the present disclosure with reference to the accompanying drawings in embodiments of the present disclosure. Apparently, the described embodiments are merely some but not all of embodiments of the present disclosure. All other embodiments obtained by a person of ordinary skill in the art based on embodiments of the present disclosure without creative efforts shall fall within the protection scope of the present disclosure.

[0076] The present disclosure provides at least one cleaning device, including a water surface cleaning device configured to perform water surface cleaning, an underwater cleaning device configured to perform underwater cleaning, and a multi-functional cleaning device configured to perform underwater cleaning and water surface cleaning. A type of a water body cleaning device is not limited in following descriptions, and a construction, a structure, a function, controlling, and other aspects of the water body cleaning device are described. As shown in FIG. **1**, the present disclosure provides a water surface cleaning device capable of independently performing water surface cleaning. As shown in FIG. **4** and FIG. **5**, the present disclosure provides a multi-functional cleaning device capable of performing underwater cleaning and water surface cleaning.

[0077] FIG. **1** is a first partial schematic view of a cleaning device according to a first embodiment of the present disclosure. FIG. **2** is a first cross-sectional view of the cleaning device according to the first embodiment of the present disclosure. FIG. **3** is a partial side view of the cleaning device according to the first embodiment of the present disclosure. The present disclosure provides a water surface cleaning device. The water surface cleaning device may clean debris in a pool, such as an object floating on a water surface. The water surface cleaning device includes a cleaning device body **100**, an adjustment mechanism **200**, a moving mechanism **300** (as shown in FIG. **20**), a main cleaning mechanism **400**, an auxiliary cleaning mechanism **500**, a solar mechanism **600**, and a water quality treatment assembly **810**. The cleaning device body **100** has an outer side portion (not shown in the figure). The outer side portion is a peripheral region of the cleaning device body **100**, and may be understood as a peripheral contour of a cleaning device **1000**. There may be a plurality of outer side portions. An accommodating opening **102** is provided on at least one outer side portion. An accommodating groove **108** is provided at the cleaning device body **100**, and is configured to accommodate at least a part of the main cleaning mechanism **400**. The accommodating opening **102** communicates with the accommodating groove **108**. The adjustment mechanism **200** is disposed at the cleaning device body **100**. The adjustment mechanism **200** is configured for the water surface cleaning device to perform water surface operation. For example, the adjustment mechanism **200** includes at least one buoyancy cavity **210**. The buoyancy cavity **210** is provided at the cleaning device body **100** and configured to adjust the cleaning device body **100** to be at least partially located on the water surface.

[0078] The moving mechanism **300** is disposed at the cleaning device body **100**. The moving mechanism **300** is configured to drive the cleaning device body **100** to move. The moving mechanism **300** may include a propeller **310** (as shown in FIG. **36**).

[0079] The main cleaning mechanism **400** is at least configured to perform filtering. The main cleaning mechanism **400** includes at least one filtering box **410**. The filtering box **410** is at least partially accommodated in the accommodating groove **108**. The filtering box **410** is of a frame structure, and at least a part of the filtering box **410** is hollowed. A filtering layer (not shown) is provided at a hollowed region of the filtering box **410**. The filtering layer has a filtering function, and is configured to filter debris in sewage flowing through the filtering box **410** and configured for the debris to remain inside the filtering box **410**. Certainly, the filtering box **410** may alternatively be a filtering bag. A debris inlet **413** is provided on the filtering box **410**. A position of the accommodating opening **102** may be the same as that of the debris inlet **413**, and the accommodating opening **102** communicates with the debris inlet **413**. Alternatively, the position of the accommodating opening **102** may be different from that of the debris inlet **413**, and a liquid inlet is provided on the cleaning device body **100** and communicates with the debris inlet **413**. During a cleaning process, a dust-loaded water flow may flow through the accommodating opening **102**, the debris inlet **413**, the inside of the filtering box **410**, and the outside of the filtering box **410** sequentially, to form a cleaned water flow channel (not shown). Alternatively, during the cleaning process, the dust-loaded water flow may flow through the liquid inlet, the debris inlet **413**, the inside of the filtering box **410**, and the outside of the filtering box **410** sequentially, to form a cleaned water flow channel. The liquid inlet and the accommodating opening **102** are disposed at

different positions. The cleaning water flow channel can be configured to separate a water flow from the debris, so that the debris remains in the filtering box **410**. The main cleaning mechanism **400** may be detachably mounted inside the accommodating groove **108** through the accommodating opening **102**, so that the filtering box **410** can be conveniently mounted and removed to dump the debris.

[0080] In an embodiment, a frame of the filtering box **410** is made of plastic or similar materials. Another different material which is more buoyant than the frame of the filtering box **410**, such as foam, is attached or fixed to the frame, so that the filtering box **410** can float on the water surface. The material can be located at the bottom of the filtering box **410** or other positions. This is not limited here. In this way, the following case can be avoided: The filtering box **410** is difficult to retrieve in time if the filtering box **410** sinks accidentally in the pool, for example, when the user takes out the filtering box **410** from the cleaning device **1000** in the pool, the filtering box **410** accidentally falls into the pool.

[0081] The auxiliary cleaning mechanism **500** is disposed at the cleaning device body **100**. The auxiliary cleaning mechanism **500** is at least configured to increase a cleaning range of the debris inlet **413**. The auxiliary cleaning mechanism **500** is configured to perform auxiliary cleaning to improve cleaning efficiency. The auxiliary cleaning mechanism **500** may be configured to increase the cleaning range of the debris inlet **413**. For example, debris outside of a cleaning route of the debris inlet **413** may be guided to the cleaning range of the debris inlet **413** through the auxiliary cleaning mechanism **500**. In addition, the auxiliary cleaning mechanism **500** may be configured to perform auxiliary cleaning. For example, when the water surface cleaning device moves at a region close to a wall of a pool, the auxiliary cleaning mechanism **500** may clean the wall of the pool.

[0082] The solar mechanism **600** includes a solar panel. The solar panel is provided on a top surface of the cleaning device body **100** to supplement energy for the water surface cleaning device. The cleaning device body **100** includes a top cover **107**. The top cover **107** may be the top of the cleaning device body **100**. The top cover **107** is connected to an outer side wall of the cleaning device body **100**. Compared with the related technology in which the top cover needs to be turned over and opened to mount and remove the filtering box, in embodiments of the present disclosure, because the filtering box **410** in the main cleaning mechanism **400** is mounted in the accommodating groove **108** through the accommodating opening **102** disposed on the outer side portion, the user does not need to frequently flip and open the top cover **107** during processes of mounting and removing the filtering box **410**, and the solar mechanism **600** may be directly fixed on the cleaning device body **100**, that is, the solar mechanism **600** is not a detachable mechanism. This improves stability of the solar panel and various wires in the solar mechanism **600** and a service life of the solar mechanism **600**. In addition, an area of the solar panel can be designed to be larger to improve energy supplement efficiency.

[0083] FIG. **4** is a first schematic structural view of the cleaning device according to a second embodiment of the present disclosure. FIG. **5** is a second schematic structural view of the cleaning device according to the second embodiment of the present disclosure. FIG. **6** is an enlarged schematic view of a portion B shown in FIG. **5**. Some embodiments of the present disclosure provide a multi-functional cleaning device. The multi-functional cleaning device includes the cleaning device body **100**, the adjustment mechanism **200**, the moving mechanism **300**, the main cleaning mechanism **400**, and the auxiliary cleaning mechanism **500**. The multi-functional cleaning device may perform all-round cleaning in a water body environment, that is, a bottom, the wall, a water body, a waterline, and the water surface of the pool may be cleaned. The adjustment mechanism **200** is configured to adjust an operation position and an attitude of the multi-functional cleaning device in the water, to clean each target position in the water. When underwater cleaning is performed, the main cleaning mechanism **400** includes at least one filtering box and a main water pump. When the main water pump is in operation, a cleaned water flow, which sequentially flows through the liquid inlet, the filtering box, the main water pump, and an outlet of the multi-

functional cleaning device, is generated by the main water pump. When water surface cleaning is performed, an operation process of the multi-functional cleaning device is similar to that of the water surface cleaning device.

[0084] The adjustment mechanism **200** may include the buoyancy cavity **210** and a buoyancy cavity adjustment assembly. The buoyancy cavities **210** are substantially symmetrically provided at the cleaning device body **100**. The buoyancy adjustment assembly communicates with the buoyancy cavity **210**, to adjust a volume of liquid or gas in the buoyancy cavity **210** when the multi-functional cleaning device performs different cleaning modes. Therefore, different poses of the multi-functional cleaning device can be switched in the water, the waterline, and the water surface. Alternatively, the buoyancy cavity **210** is filled with a material for the cleaning device body **100** to float on the water surface, such as foam, so that the cleaning device **100** can perform water surface cleaning. In a specific embodiment, the material filled in the buoyancy cavity **210** may have low water-absorbing quality to prevent the cleaning device body **100** from sinking after the material absorbs water. This improves stability of the cleaning device body **100** on the water surface.

[0085] FIG. **1** to FIG. **3** illustrate schematic structural views of the water surface cleaning device according to the present disclosure. FIG. **4** and FIG. **5** illustrate schematic structural views of the multi-functional cleaning device according to the present disclosure. FIG. **6** is an enlarged schematic view of a portion B shown in FIG. **5**. The water surface cleaning device and the multi-functional cleaning device in embodiments are both represented by the cleaning device **1000**. The cleaning device **1000** includes the cleaning device body **100** and the auxiliary cleaning mechanism **500**. The auxiliary cleaning mechanism **500** includes a first auxiliary cleaning assembly **510**. The cleaning device body **100** may move along a reference plane. The reference plane may be a bottom wall of the pool, a side wall of the pool, or the water surface of the pool. The reference plane may be defined as a reference plane substantially parallel to a forward direction of the cleaning device **1000** and a to-be-cleaned surface, such as a reference plane **1** shown in FIG. **4**. The cleaning device body **100** includes a first side portion **1011**, a second side portion part **1012**, and a third side portion **1013**. The outer side portion includes at least the first side portion **1011**, the second side portion **1012**, and the third side portion part **1013**.

[0086] The first side portion **1011** is a side surface facing a forward direction X of the cleaning device body **100**. The debris inlet **413** is provided at the first side portion **1011**. The debris inlet **413** is an opening configured for a water flow, stains, and the like to enter the cleaning device body **100**. The stains may be debris floating in the pool, scale or black stains accumulated in the pool, and the like. The second side portion **1012** and the third side portion **1013** are both connected to the first side portion **1011**, and are provided at two sides of the first side portion **1011**. Looking from a rear portion of the cleaning device **1000** to a front portion of the cleaning device **1000**, the second side portion **1012** is located on a left side of the cleaning device body **100**, and the third side portion **1013** is located on a right side of the cleaning device body **100**.

[0087] The first auxiliary cleaning assembly **510** may be configured to clean the pool. The first auxiliary cleaning assembly **510** is configured to increase the cleaning range of the debris inlet **413** or configured to be in physical contact with and clean the wall of the pool located at a side of the cleaning device **1000**.

[0088] Specifically, the cleaning range of the debris inlet **413** is a range in which the debris inlet **413** may affect the water flow and the stains when the debris inlet **413** is in a state of sucking the water flow and the stains. Generally, the cleaning range of the debris inlet **413** may be a coverage region or a working region of the debris inlet **413** during a moving process of the cleaning device **1000**. The debris inlet **413** directly or indirectly has a suction capability to suck the water flow and the stains, or the debris inlet **413** does not have the suction capability, and the cleaning device body **100** moves relative to the water flow, so that the water flow and the stains are drawn into the debris inlet **413**. The first auxiliary cleaning assembly **510** may be provided on an outer surface region in

which the second side portion **1012** or the third side portion **1013** transitions to the first side portion **1011**. In other words, when the first auxiliary cleaning assembly **510** is in operation, the first auxiliary cleaning assembly **510** may act on a side of the cleaning device **1000** and the front portion of the cleaning device **1000**. Alternatively, the first auxiliary cleaning assembly **510** may be disposed inside the cleaning device body **100**. Alternatively, the first auxiliary cleaning assembly **510** may be disposed at the forward portion of the cleaning device body **100**, namely, the first side portion **1011**. Alternatively, the first auxiliary cleaning assembly **510** may be disposed at a side portion of the cleaning device body **100**, namely, the second side portion **1012** and/or the third side portion **1013**.

[0089] Based on the above disposition, when the cleaning device body **100** moves forward along the forward direction, because the debris inlet **413** is located at the front portion of the cleaning device body **100**, the debris inlet **413** may suck the stains as the cleaning device body **100** moves forward. Under the action of the first auxiliary cleaning assembly **510**, debris, which is originally located outside of the coverage region of the debris inlet **413**, may be guided to the working region of the debris inlet **413**. In this way, the cleaning range of the debris inlet **413** is increased accordingly, thereby improving debris cleaning efficiency.

[0090] The first auxiliary cleaning assembly **510** agitates the water flow toward the debris inlet **413**, or a suction force of the debris inlet **413** is improved, to increase the cleaning range of the debris inlet **413**. This is not limited herein. In an embodiment, the first auxiliary cleaning assembly **510** may be rotatably provided at the cleaning device body **100** to agitate the water flow near the debris inlet **413**, so that the water flow located outside the working region of the debris inlet **413** flows to the working region of the debris inlet **413**. In this way, debris located outside the working region can be driven to flow to the working region of the debris inlet **413** with the water flow, and flow into the cleaning device body **100**.

[0091] A rotation direction of the first auxiliary cleaning assembly **510** may be set based on an actual situation, provided that the water flow can be agitated to flow to the debris inlet **413**. For example, as shown in FIG. **4**, in a case in which it is viewed from the top of the cleaning device **1000** to the bottom of the cleaning device **1000** along the forward direction X, when the first auxiliary cleaning assembly **510** is closer to the left side of the cleaning device body **100** relative to the debris inlet **413**, the first auxiliary cleaning assembly **510** rotates in a clockwise direction, and when the first auxiliary cleaning assembly **510** is closer to the right side of the cleaning device body **100** relative to the debris inlet **413**, the first auxiliary cleaning assembly **510** rotates in a counterclockwise direction. Based on the above disposition, when the first auxiliary cleaning assembly **510** is in operation, a water flow away from the debris inlet **413**, especially a water flow located at a left front or a right front of the cleaning device **1000**, is agitated and guided to the debris inlet **413**. A direction of the water flow is substantially opposite to the forward direction of the cleaning device **1000**, that is, as the cleaning device **1000** moves, the water flow guided by the first auxiliary cleaning assembly **510** may be sucked into the cleaning device body **100** through the debris inlet **413**.

[0092] In an embodiment, as shown in FIG. **3** and FIG. **4**, a vertical direction is defined as a height direction of the cleaning device **1000**, namely, a direction of a connection line between a bottom center and a top center of the cleaning device **1000**. When the cleaning device **1000** is placed horizontally, the vertical direction corresponds to a gravity direction of the cleaning device **1000**. As shown in FIG. **3** and FIG. **4**, the cleaning device **1000** is placed horizontally, and along the height direction, namely, the height direction of the cleaning device **1000**, a projection of the first auxiliary cleaning assembly **510** at least partially overlaps with a projection of the debris inlet **413**. As shown in FIG. **5**, the debris inlet **413** includes at least a first edge **4131** close to the top of the cleaning device **1000** and a second edge **4132** close to the bottom of the cleaning device **1000**. The above projection relationship between the first auxiliary cleaning assembly **510** and the debris inlet **413** may be further described as follows. Along the height direction of the cleaning device **1000**,

the projection of the first auxiliary cleaning assembly **510** is at least partially located between a projection of the first edge **4131** and a projection of the second edge **4132**. Alternatively, along the height direction of the cleaning device **1000**, the first auxiliary cleaning assembly **510** is at least partially located between the first edge **4131** and the second edge **4132**.

[0093] As shown in FIG. **3**, a projection height of the first auxiliary cleaning assembly **510** in the height direction is h**1**, a projection height of the debris inlet **413** in the height direction may be h**2** or h**3**, and h**1** at least partially overlaps with h**2** or h**3**.

[0094] When the cleaning device **1000** performs a water surface cleaning operation, the debris inlet **413** is at least partially located below the water surface. In other words, the second edge **4132** is located below the water surface, and the first edge **4131** may be located above or below the water surface. The first auxiliary cleaning assembly **510** may be at least partially located below the water surface. In a case where the first edge **4131** of the debris inlet **413** is located above the water surface, one portion of the first auxiliary cleaning assembly **510** is located on the water surface, and the other portion of the first auxiliary cleaning assembly **510** is located below the water surface may be taken as an example. In this case, one portion of the debris inlet **413** is located on the water surface, and the other portion of the debris inlet **413** is located below the water surface. When the first auxiliary cleaning assembly **510** is in operation, debris near the cleaning device **1000** may be guided to a region between the first edge **4131** and the second edge **4132**, and may be directly sucked into the debris inlet **413**.

[0095] In an embodiment, as shown in FIG. **1** and FIG. **7**, at least a part of the first auxiliary cleaning assembly **510** is disposed in front of the debris inlet **413** along the X direction. As the cleaning device body **100** moves forward, debris cleaned and driven by the first auxiliary cleaning assembly **510** may naturally reach the working region of the debris inlet **413**.

[0096] In an embodiment, as shown in FIG. **6** and FIG. **12**, the first auxiliary cleaning assembly **510** includes a side brush **511** and a rotation shaft **512**. The side brush **511** is disposed around the rotation shaft **512**. The rotation shaft **512** is rotatably connected to the cleaning device body **100**. The side brush **511** includes a side brush strip (not shown). The side brush strip includes a side brush body **5112** and several cleaning portions **5111** provided at the side brush body **5112** at intervals. The cleaning portion **5111** includes at least one cleaning surface **51111**. The cleaning surface **51111** is obliquely configured relative to the reference plane **1**. The cleaning surface **51111** is configured to agitate the water flow or be in contact with and clean the wall of the pool. Specifically, when the rotation shaft **512** rotates, the rotation shaft **512** is configured to drive the side brush **511** to rotate. When the side brush **511** rotates, the cleaning surface **51111** is configured to agitate the water flow or be in contact with the wall of the pool.

[0097] In an embodiment, as shown in FIG. **38***b*, shapes of different cleaning portions **5111** of one side brush body **5112** may be different. For example, one cleaning portion **5111** has a tail end away from the rotation shaft **512**, and the tail end is in a straight-line shape; and one cleaning portion **5111** has a tail end away from the rotation shaft **512**, and the tail end is serrated. The tail end of the cleaning portion **5111** is set to be serrated, so that the cleaning portion **5111** can block some debris, such as long hair, which is convenient for the user to perform cleaning. The tail end of the cleaning portion **5111** is set to be in a straight-line shape, so that the side brush body **5112** can better stir the water flow. Different cleaning portions **5111** of the side brush body **5112**, such as adjacent cleaning portions **5111**, are set to be in different shapes, to ensure a stirring effect of the side brush **511** while the side brush **511** can block the debris.

[0098] The cleaning surface **51111** obliquely configured relative to the reference plane **1** may agitate the water flow at an oblique angle. In this way, when the side brush **511** rotates, it is not easy for the side brush **511** to form, along a tangential direction of an edge of the side brush **511**, a water flow substantially parallel to the forward direction X. Stains located near the edge of the side brush **511** may not be constantly pushed forward by the water flow, so that the stains can approach the debris inlet **413**.

[0099] In an embodiment, the rotation shaft **512** is configured obliquely at the cleaning device body **100**, that is, the rotation shaft **512** is disposed at an angle Y relative to the reference plane **1**. The angle Y may be set in a range from 0° to 90°, such as 30°, 40°, 60°, 70°, 75°, or 80°. This is not limited herein. The rotation shaft **512** is obliquely configured, so that the first auxiliary cleaning assembly **510**, namely, the side brush **511**, can rotate obliquely in the water. A portion of the side brush **511** is close to the debris inlet **413**, and the portion is in contact with the water. A portion of the side brush **511** is away from the debris inlet **413**, and the portion is located above the water surface or mostly located above the water surface. A direction of a linear velocity at which the side brush **511** agitates the water body points to the debris inlet **413** all the time, so that it can be effectively ensured that the side brush **511** can guide the debris to the working region of the debris inlet **413** instead of pushing the debris away, thereby improving water surface cleaning efficiency.
[0100] There may be one, two, three, or a plurality of cleaning surfaces **51111**. This is not limited herein. The rotation shaft **512** may be connected to a drive part disposed at the cleaning device body **100**. The drive part is configured to drive the rotation shaft **512** to rotate. The drive part may be a stepper motor, and the like.
[0101] An inclined direction of an axis of the rotation shaft **512** relative to the reference plane **1** may be determined based on an actual situation. In an embodiment, as shown in FIG. **8** to FIG. **10**, the cleaning device **1000** includes a first reference plane α, and the first reference plane α is perpendicular to the reference plane **1** and the forward direction X. In other words, the first reference plane α is a plane extending along a left-right direction of the cleaning device body **100**. In another embodiment, a reference center line γ is set between the second side portion **1012** and the third side portion **1013**. The reference center line γ is a line of the connection line between the center of the top of the cleaning device **1000** and the center of the bottom of the cleaning device **1000**. In other words, when the cleaning device **1000** is placed horizontally, the reference center line γ is a virtual straight line substantially parallel to a gravity line of the cleaning device **1000**. In another embodiment, as shown in FIG. **8**, the cleaning device **1000** includes a second reference plane β, and the second reference plane β is substantially perpendicular to the reference plane **1** and substantially parallel or coincident with the forward direction X. In another embodiment, the cleaning device **1000** further includes a third reference plane, and the third reference plane is a plane different from the first reference plane and the second reference plane. The axis of the rotation shaft **512** may be located in the first reference plane α, the second reference plane β, or the third reference plane. No matter which reference plane the axis of the rotation shaft **512** is located in, on the whole, a portion of the axis of the rotation shaft **512***a* is close to the top of the cleaning device **1000**, another portion of the axis of the rotation shaft **512***a* is close to the bottom of the cleaning device **1000**, and a distance between the portion close to the top of the cleaning device **1000** and the reference center line γ is less than a distance between the portion close to the bottom of the cleaning device **1000** and the reference center line γ. In other words, a distance between a center of an upper surface of the side brush **511** and the reference center line γ is less than a distance between a center of a lower surface of the side brush **511** and the reference center line γ, that is, a position at which the side brush **511** is close to an outer contour of the cleaning device body **100** is higher than a position at which the side brush **511** is close to the reference center line γ of the cleaning device body **100**. In other words, it may be understood that the rotation shaft **512** inclines toward the interior of the cleaning device body **100**.
[0102] In other embodiments, the distance between the center of the upper surface of the side brush **511** (the center may be understood as an intersection point at which the axis of the rotation shaft **512** intersects with the upper surface of the side brush **511**) and the reference center line γ is greater than the distance between the center of the lower surface of the side brush **511** and the reference center line γ. Accordingly, the position at which the side brush **511** is close to the outer contour of the cleaning device body **100** is lower than the position at which the side brush **511** is close to the reference center line γ of the cleaning device body **100**. In other words, it may be understood that

the rotation shaft **512** inclines toward the exterior of the cleaning device body **100**, and as the side brush **511** rotates, there is a tendency that deep water at an outer edge of the cleaning device **1000** may be guided to the debris inlet **413**.

[0103] In another embodiment, the axis of the rotation shaft **512** of the side brush **511** is substantially parallel to the reference center line γ. In this case, the side brush **511** may be substantially horizontally provided at the cleaning device body **100**. During an operation process of the cleaning device **1000**, one portion of the side brush **511** may be located on the water surface, and the other portion of the side brush **511** may be located below the water surface, so that there is also a tendency that debris at the outer edge of the cleaning device body **100** may be guided to the working region of the debris inlet **413**. Certainly, in this case, the cleaning portion **5111** is obliquely configured relative to the rotation shaft **512** to guide the water flow to the debris inlet **413**.

[0104] In an embodiment, the side brush **511** includes several cleaning portions **5111**. The several cleaning portions **5111** are provided around a periphery of the rotation shaft **512**. The several cleaning portions **5111** extend, as a whole, along an axial direction of the rotation shaft **512**. A side of the cleaning portion **5111** has a cleaning surface **51111**. The cleaning surface **51111** is a side surface of the cleaning portion **5111**, and the side surface faces the rotation direction of the rotation shaft **512**. An extending direction of the cleaning surface **51111** may be substantially parallel to the rotation shaft **512** or set at an angle relative to the rotation shaft **512** (that is, the several cleaning portions **5111** are disposed around the periphery of the rotation shaft **512** in a spiral rotation manner). Therefore, the cleaning portion **5111** is disposed axially along the rotation shaft **512**, so that the side brush **511** has a simple structure and is easy to manufacture. When the inclined rotation shaft **512** rotates, the cleaning portion **5111** can agitate the water flow at an oblique angle relative to the reference plane **1**.

[0105] At least some of the cleaning portions **5111** are made of a flexible material, and/or at least some of the cleaning portions **5111** are made of a rigid material. In an embodiment, all the cleaning portions **5111** are made of a flexible material. In another embodiment, all the cleaning portions **5111** are made of a rigid material. In another embodiment, some of the cleaning portions **5111** are made of a flexible material, and some of the several cleaning portions **5111** are made of a rigid material. The flexible material is a material capable of undergoing elastic deformation. The rigid material is a material that cannot easily undergo elastic deformation.

[0106] When the cleaning portion **5111** is made of a flexible material, the cleaning portion **5111** may be a bristle, a rubber sheet, or the like. When the cleaning portion **5111** is made of a rigid material, the cleaning portion **5111** may be a plastic blade, a metal blade, or the like. There may be one, two, three, or a plurality of cleaning portions **5111**. This is not limited herein.

[0107] Specifically, in an embodiment, the cleaning surface **51111** is obliquely configured relative to the reference plane **1**, including a case where the axis of the rotation shaft **512** is substantially perpendicular to the reference plane **1**. The side brush **511** includes the several cleaning portions **5111**. The several cleaning portions **5111** are provided around the periphery of the rotation shaft **512**. The several cleaning portions **5111** incline or bend toward the rotation direction of the rotation shaft **512**. The side of the cleaning portion **5111** has the cleaning surface **51111**. The cleaning surface **51111** is the side surface of the cleaning portion **5111**, and the side surface faces the rotation direction of the rotation shaft **512**. When the rotation shaft **512** rotates, the inclined and bent cleaning portion **5111** may agitate the water flow at an oblique angle.

[0108] A quantity of first auxiliary cleaning assemblies **510** and a position of the first auxiliary cleaning assembly **510** may be determined based on an actual situation. In an embodiment, one first auxiliary cleaning assembly **510** may be provided at the second side portion **1012** or the third side portion **1013** of the cleaning device **1000**. Alternatively, one first auxiliary cleaning assembly **510** may be provided at each of the second side portion **1012** and the third side portion **1013**. In this embodiment, the first auxiliary cleaning assembly **510** may be disposed at any position on the second side portion **1012** and/or at any position on the third side portion **1013**, such as a position

close to the front portion of the cleaning device body **100**, a center position of the side portion, or the rear portion of the cleaning device body **100**. In another embodiment, the first auxiliary cleaning assembly **510** may be provided at a transition position between the first side portion **1011** and the second side portion **1012** of the cleaning device **1000** and/or a transition position between the first side portion **1011** and the third side portion **1013** of the cleaning device **1000**. In this case, a part of the first auxiliary cleaning assembly **510** protrudes from the first side portion **1011**, and another part of the first auxiliary cleaning assembly **510** protrudes from the second side portion **1012** and/or the third side portion **1013**.

[0109] In an embodiment, a connection portion **530** extends from the cleaning device body **100** along the forward direction X, and the first auxiliary cleaning assembly **510** is provided at the connection portion **530**. The connection portion **530** may extend from the second side portion **1012** or the third side portion **1013** along the forward direction X, or the connection portion **530** may be additionally provided from the first side portion **1011** along the forward direction X.

[0110] In an embodiment, the cleaning device **1000** further includes a roller brush **450**. The roller brush **450** may be rotatably provided at the cleaning device body **100** or an inlet for water surface cleaning of the filtering box **410**. The inlet for water surface cleaning is a debris inlet when the cleaning device body **100** performs water surface cleaning, and the inlet for water surface cleaning of the filtering box **410** may be the debris inlet **413** or another inlet. As the roller brush **450** rotates, a water flow outside the filtering box **410** is guided to flow through the inlet for water surface cleaning of the filtering box **410** and enters the interior of the filtering box **410**. When the cleaning device **1000** is in a state of cleaning the water surface, the roller brush **450** is at least partially located below the water surface to effectively agitate the water flow at the inlet for water surface cleaning of the filtering box **410**, thereby improving efficiency of external debris entering the filtering box **410**. In addition, a part of debris inside the filtering box **410** is prevented from being regurgitated to the to-be-cleaned region. In a specific embodiment, when water surface cleaning is performed, one portion of the roller brush **450** is located below the water surface, and the other portion of the roller brush **450** is located on the water surface, which corresponds to a case where the portion of the debris inlet **413** is located on the water surface, and the other portion of the debris inlet **413** is located below the water surface, to implement a better water surface cleaning effect.

[0111] Therefore, in an embodiment, when the cleaning device **1000** performs water surface cleaning, the portion of the debris inlet **413** is located on the water surface, and the other portion of the debris inlet **413** is located below the water surface, so that debris floating on the water surface, such as leaves and garbage bags, can naturally enter the filtering box **410** along with a water flow at the water surface. The portion of the roller brush **450** is located below the water surface, and the other portion of the roller brush **450** is located on the water surface, so that, in the working region of the debris inlet **413**, the roller brush **450** can at least guide the water flow at the water surface to the debris inlet **413**. The rotation shaft **512** of the first auxiliary cleaning assembly **510** is configured obliquely, so that when the first auxiliary cleaning assembly **510** is in operation, debris floating on the water surface and located outside the working region of the debris inlet **413** can be guided to the working region of the debris inlet **413** from the side portion and the front portion of the cleaning device body **100**. Further, with a movement of the cleaning device **1000** and under the action of the roller brush **450**, the debris can be guided to pass through the debris inlet **413** and finally enter the filtering box **410**.

[0112] FIG. **11** to FIG. **13** illustrate a structure of the first auxiliary cleaning assembly **510** of the cleaning device **1000**, and the auxiliary cleaning assembly **510** is the side brush **511**. The side brush **511** includes the side brush strip. The side brush strip includes at least a side brush body **5112** and several cleaning portions **5111** provided at the side brush body **5112** at intervals. The side of the cleaning portion **5111** has the cleaning surface **51111**. The cleaning portion **5111** may be detachably or fixedly provided at the side brush body **5112**. In this embodiment, the several cleaning portions **5111** are integrally provided on the side brush body **5112** to form the side brush strip, and the side

brush strip is provided around the periphery of the rotation shaft **512**. Since the side brush strip is a wearing part, it is convenient to disassemble, replace, and maintain the side brush strip.

[0113] In an embodiment, the several cleaning portions **5111** may be provided at the side brush body **5112** at equal intervals or unequal intervals. A disposition manner of adjacent cleaning portions **5111** may be determined based on an actual requirement. For example, the adjacent cleaning portions **5111** may be disposed in a straight line along a width direction of the side brush body **5112**, or the adjacent cleaning portions **5111** may be disposed in a straight line at an angle relative to the width direction of the side brush body **5112**, or the adjacent cleaning portions **5111** may be disposed in a curved line along the width direction of the side brush body **5112**. When the side brush body **5112** is provided around the periphery of the rotation shaft **512**, at least some of the cleaning portions **5111** extend along the axial direction of the rotation shaft **512** and are substantially perpendicular to the side brush body **5112**. Alternatively, at least some of the cleaning portions **5111** extend along the axial direction of the rotation shaft **512** and are obliquely configured relative to the side brush body **5112**. In this way, the cleaning portion **5111** is disposed at the side brush body **5112** in various forms, provided that performance requirements that the cleaning surface **51111** is in contact with and agitates the water flow can be met.

[0114] In some embodiments, the first auxiliary cleaning assembly **510** further includes a hub **513**. The hub **513** is sleeved on the rotation shaft **512**. The several cleaning portions **5111** are provided around a periphery of the hub **513**, or the several cleaning portions **5111** are provided around the hub **513** through the side brush body **5112**. The hub **513** is provided, so that a diameter of the side brush **511** is increased, and a quantity of cleaning portions **5111** or an overall length of the side brush strip can be increased, thereby increasing the cleaning range of the cleaning device **1000**. The several cleaning portions **5111** are detachably connected to the periphery of the hub **513**, or the several cleaning portions **5111** may be detachably connected to the periphery of the hub **513** through the side brush body **5112**, so that the several cleaning portions **5111** or the side brush strip are conveniently mounted and replaced. Specifically, the several cleaning portions **5111** or the side brush strip may be fixed on the hub **513** through a fixing part. The fixing part may be, but is not limited to, a screw, a buckle, or the like.

[0115] When the side brush strip is detachably mounted on the rotation shaft **512** or the hub **513**, there may be one, two, or a plurality of side brush strips. When there is one side brush strip, a head end of the side brush strip is overlapped with a tail end of the side brush strip, and the fixing part passes through the head end and the tail end of the side brush strip and is fixed on the rotation shaft **512** or the hub **513**. Alternatively, the side brush strip is annular and is sleeved, as a whole, on the periphery of the rotation shaft **512** or the periphery of the hub **513**. When there are a plurality of side brush strips, the plurality of side brush strips are sequentially provided around the rotation shaft **512** or the hub **513** end to end. Each side brush strip is fixed through a corresponding fixing part.

[0116] In some embodiments, the hub **513** is detachably connected to the rotation shaft **512**. The hub **513** may be mounted on the periphery of the rotation shaft **512**, and may be detached from the periphery of the rotation shaft **512**. When the hub **513** is damaged due to extended use or excessive frequency of use, the hub **513** only needs to be replaced, to improve usage convenience.

[0117] In an embodiment, the hub **513** includes a first hub **5131**, a second hub **5132**, and a shaft sleeve **5133**. The first hub **5131** is detachably connected to the second hub **5132**. The shaft sleeve **5133** is embedded between the first hub **5131** and the second hub **5132**. When the first hub **5131** and the second hub **5132** are connected, the shaft sleeve **5133** is limited between the first hub **5131** and the second hub **5132**, thereby locking the shaft sleeve **5133**. The shaft sleeve **5133** is detachably connected to an end of a drive shaft of a side brush drive motor **552**. The hub **513** is mounted on the end of the drive shaft through the shaft sleeve **5133** and rotates with the drive shaft without locking the first hub **5131** and the second hub **5132** on the drive shaft. In this way, the first hub **5131** and the second hub **5132** can be disassembled and replaced subsequently, thereby

reducing a disassembly operation.

[0118] The first hub **5131** and the second hub **5132** may be spliced together to form a ring-shaped structure, which is configured to be sleeved on a periphery of the drive shaft. The first hub **5131** and the second hub **5132** may be symmetrically disposed, that is, a shape of the first hub **5131** may be the same as a shape of the second hub **5132**, and the first hub **5131** and the second hub **5132** are symmetrical. Alternatively, the first hub **5131** and the second hub **5132** may be asymmetrically disposed. A position at which the first hub **5131** and the second hub **5132** are spliced together may be fixed through a fixing part. For example, when the first hub **5131** and the second hub **5132** are symmetrically disposed, an end surface of the first hub **5131** and an end surface of the second hub **5132** are disposed opposite to and attached to each other. At least one fixing part may simultaneously fix one end of the first hub **5131** and one end of the second hub **5132**. At least another fixing part may simultaneously fix the other end of the first hub **5131** and the other end of the second hub **5132**. When there are substances, such as hair, prone to wrap around the side brush strip and the hub **513**, between the side brush strip and the hub **513** or in the hub **513**, the side brush strip, the first hub **5131**, and the second hub **5132** are disassembled to clean the substances such as hair. This improves efficiency in cleaning the substances such as hair, and therefore improves usage convenience. The above fixing part may be, but is not limited to, a fixing screw.

[0119] In another embodiment, the hub **513** can be of an integral structure. When the hub **513** includes the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133**, the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133** are integrally formed, that is, the hub **513** is taken as a whole structure.

[0120] In another embodiment, the first auxiliary cleaning assembly **510** may perform contact cleaning. When the cleaning device body **100** moves close to the wall of the pool, the first auxiliary cleaning assembly **510** is in contact with and cleans the wall of the pool. The stains attached to the wall of the pool may be cleaned into the water by the first auxiliary cleaning assembly **510**, and at least some of the stains may be sucked into the cleaning device body **100** through the debris inlet **413**.

[0121] In an embodiment, at least one of the second side portion **1012** and the third side portion **1013** of the cleaning device **1000** may be provided with the first auxiliary cleaning assembly **510**. When the first auxiliary cleaning assembly **510** is in operation, at least a portion of the first auxiliary cleaning assembly **510** extends out of a contour of the cleaning device **1000**, that is, along the height direction of the cleaning device **1000**, at least a portion of the first auxiliary cleaning assembly **510** protrudes from the cleaning device **1000** in a region in which the first auxiliary cleaning assembly **510** is located. When the cleaning device **1000** moves or cleans along an edge of the pool, a portion of the first auxiliary cleaning assembly **510** protrudes from the cleaning device **1000**, and the portion may be in contact with the wall of the pool, thereby cleaning the wall of the pool.

[0122] In an embodiment, the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133** are made of a same material or different materials. Each of the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133** is made of a rigid material. The rigid material may be, but is not limited to, a plastic wear-resistant material, an alloy material, and the like. For example, each of the first hub **5131** and the second hub **5132** is made of the plastic wear-resistant material. For example, the plastic wear-resistant material may be, but is not limited to, a polyformaldehyde resin material. The shaft sleeve **5133** may be made of the alloy material. For example, the alloy material may be, but is not limited to, an aluminum alloy material. Alternatively, each of the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133** is made of the plastic wear-resistant material. Each of the first hub **5131**, the second hub **5132**, and the shaft sleeve **5133** is made of a rigid material, so that overall strength of the hub **513** can be improved, thereby improving the service life of the first auxiliary cleaning assembly **510**.

[0123] When the hub **513** is made of a rigid material, an outer contour of the hub **513** and/or the

side brush body **5112** are/is disposed in the outer contour of the cleaning device body **100** and do/does not protrude from the outer contour of the cleaning device body **100**. An outer diameter of the hub **513** and/or a position of the side brush body **5112** are/is limited, so that damage to the wall of the pool or the hub caused by collision of the hub **513** with the wall of the pool during a moving process of the first auxiliary cleaning assembly **510**. At least some of the several cleaning portions **5111** on the side brush strip protrude from the outer contour of the cleaning device body **100**, so that the first auxiliary cleaning assembly **510** can clean the wall of the pool and assist in guiding to escape from the trap. For example, when the first auxiliary cleaning assembly **510** is provided at the second side portion **1012**, the outer contour of the hub **513** or the side brush body **5112** does not protrude from the second side portion **1012**, and the at least some of the several cleaning portions **5111** protrude from the second side portion **1012**. When the first auxiliary cleaning assembly **510** is provided at other positions on the cleaning device body **100**, the first auxiliary cleaning assembly **510** may also be provided to meet the above conditions. Details are not described herein.

[0124] Each of the first hub **5131**, the second hub **5132**, and the side brush strip may be made of a same material. When at least a part of the side brush strip is made of a rigid material, both the first hub **5131** and the second hub **5132** may be made of a rigid material. When the side brush strip is made of a flexible material, both the first hub **5131** and the second hub **5132** may be made of a flexible material. When both the first hub **5131** and the second hub **5132** are made of a flexible material, the outer contour of the hub **513** and/or the side brush body **5112** may be located in the cleaning device body **100**, or at least partially located outside the cleaning device body **100**. In this case, the hub **513** has little impact on a wall surface of the pool. During actual use, the side brush body **5112** and the cleaning portion **5111** may be made of a same material or different materials. For example, each of the side brush body **5112** and the cleaning portion **5111** is made of a flexible material, or the side brush body **5112** may be made of a rigid material, and each of the several cleaning portions **5111** may be made of a flexible material, or some of the several cleaning portions **5111** may be made of a flexible material, and some of the several cleaning portions **5111** may be made of a rigid material. This is not limited herein.

[0125] FIG. **14** is a schematic structural view of a portion C shown in FIG. **13**. With reference to FIG. **1**, FIG. **2**, and FIG. **11** to FIG. **13**, in some embodiments, the first auxiliary cleaning assembly **510** further includes an auxiliary drive assembly **550**. The auxiliary drive assembly **550** is in transmission connection to the first auxiliary cleaning assembly **510** and configured to drive the first auxiliary cleaning assembly **510** to rotate. The first auxiliary cleaning assembly **510** further includes a barrier wall structure **514**. The barrier wall structure **514** may be of labyrinth structure. The barrier wall structure **514** may include a first barrier wall portion **5141**. The first barrier wall portion **5141** is provided on an end surface of the hub **513**, and the end surface faces the auxiliary drive assembly **550**. By providing the first barrier wall portion **5141** on the hub **513**, a winding route is extended, so that at least some of the substances, such as hair, are prevented from directly wrapping around the rotation shaft **512**, thereby reducing frequency with which the hub **513** needs to be disassembled by the user.

[0126] In addition, the barrier wall structure **514** may further include a second barrier wall portion (not shown). The auxiliary drive assembly **550** includes a drive housing **551**. The drive housing **551** includes a first drive housing **5511** and a second drive housing **5512**. A sealing portion **55121** protrudes from an end of the second drive housing **5512**, and the end is away from the first drive housing **5511**. The rotation shaft **512** extends out of the sealing portion **55121**. The second barrier wall portion may be the sealing portion **55121**. The sealing portion **55121** or the second barrier wall is enclosed by the first barrier wall portion **5141**. The substances, such as hair, at least need to pass through a route between the hub **513** and the first barrier wall portion **5141**, a route between the first barrier wall portion **5141** and the second barrier wall portion, and the second barrier wall portion before wrapping around the rotation shaft **512**. In this way, the first barrier wall portion **5141** cooperates with the second barrier wall portion, so that the substances, such as hair, are

prevented from wrapping around the rotation shaft **512**, thereby reducing the frequency with which the hub **513** is disassembled by the user to clear the hair wrapping around the rotation shaft **512**.
[0127] In some embodiments, as shown in FIG. **6**, an auxiliary mounting groove **109** is provided at the cleaning device body **100**. The auxiliary drive assembly **550** is at least partially mounted in the cleaning device body **100**, and at least partially extends into the auxiliary mounting groove **109**. The auxiliary mounting groove **109** provides a mounting position for mounting the first auxiliary cleaning assembly **510**. The cleaning device body **100** includes an auxiliary mounting portion **110**. The auxiliary mounting portion **110** may be detachably connected to the auxiliary mounting groove **109**, and may be connected to the drive housing **551** and the cleaning device body **100**. The auxiliary mounting portion **110** provides a mounting position for mounting the first auxiliary cleaning assembly **510**. The side brush **511** is at least partially mounted in the auxiliary mounting portion **110**. The auxiliary mounting groove **109** and the auxiliary mounting portion **110** are provided, so that the mounting position is provided for the side brush **511**, and at least some of the substances, such as hair, are prevented from directly entering the cleaning device body **100**. Therefore, it is convenient to clear the substances, thereby improving usage experience.
[0128] In some embodiments, as shown in FIG. **12** and FIG. **13**, the first auxiliary cleaning assembly **510** further includes the auxiliary drive assembly **550**. The auxiliary drive assembly **550** is in transmission connection to the first auxiliary cleaning assembly **510** and configured to drive the first auxiliary cleaning assembly **510** to rotate. The auxiliary drive assembly **550** includes the drive housing **551** and the side brush drive motor **552**. The side brush drive motor **552** is provided at the drive housing **551**. The drive shaft of the side brush drive motor **552** extends out of the drive housing **551**, and is in transmission connection to the first auxiliary cleaning assembly **510**. The drive shaft of the side brush drive motor **552** may be the above rotation shaft **512**. Alternatively, the drive shaft may be detachably or fixedly connected to the rotation shaft **512**.
[0129] In an embodiment, the drive housing **551** includes the first drive housing **5511** and the second drive housing **5512**. The first drive housing **5511** is detachably connected to the second drive housing **5512**. The auxiliary drive assembly **550** includes a first sealing part **553**. The first sealing part **553** is provided between the first drive housing **5511** and the second drive housing **5512**. Sealing performance between the first drive housing **5511** and the second drive housing **5512** is improved through the first sealing part **553**. The first sealing part **553** may be embedded in at least one of the first drive housing **5511** and/or the second drive housing **5512**. The first sealing part **553** may be, but is not limited to, a sealing ring (not shown).
[0130] The drive shaft at least partially extends out of the second drive housing **5512**. The sealing portion **55121** protrudes from the end of the second drive housing **5512**, and the end is away from the first drive housing **5511**. The auxiliary drive assembly **550** includes a second sealing part **554**. The side brush drive motor **552** at least partially abuts against the sealing portion **55121**, and the second sealing part **554** is provided in the sealing portion **55121**. The second sealing part **554** is sleeved on the drive shaft. The second sealing part **554** is disposed at the sealing portion **55121** of the second drive housing **551**, so that a probability that water in the pool enters the drive housing **551** and the side brush drive motor **552** can be reduced, thereby improving the sealing performance of the auxiliary drive assembly **550**. A sealing manner of the second sealing part **554** may be, but is not limited to, oil sealing (not shown).
[0131] The cleaning device **1000** needs to have a battery life of at least twenty-four hours, that is, lower power consumption of the first auxiliary cleaning assembly **510** of the cleaning device **1000** indicates a longer battery life of the cleaning device **1000**. By improving mounting accuracy of the first auxiliary cleaning assembly **510**, the power consumption of the first auxiliary cleaning assembly **510** can be reduced. In an embodiment, the auxiliary drive assembly **550** includes at least one motor fixing part **555**. The motor fixing part **555** passes through the second drive housing **5512** and is connected to the side brush drive motor **552**. The motor fixing part **555** is configured to position the side brush drive motor **552**. The side brush drive motor **552** is positioned by the above

motor fixing part **555**, so that mounting accuracy of the auxiliary drive assembly **550** is improved. In this case, a problem of friction between the first auxiliary cleaning assembly **510** and the wall of the pool can be prevented, the power consumption of the first auxiliary cleaning assembly **510** can be reduced, and therefore, a cruising ability of the cleaning device **1000** can be improved. There may be one, two, or a plurality of motor fixing parts **555**. In this embodiment, there are four motor fixing parts **555** configured to respectively fix four corners of the side brush drive motor **552**, to improve the mounting accuracy of the auxiliary drive assembly **550**. The motor fixing part **555** may be, but is not limited to, a fixing screw.

[0132] When the motor fixing part **555** passes through the second drive housing **5512** and is connected to the side brush drive motor **552**, the motor fixing part **555** is connected to the second drive housing **5512** through fixing glue (not shown). In this way, the water in the pool is prevented from entering the drive housing **551** through a gap between the motor fixing part **555** and the second drive housing **5512**, so that the internal sealing performance of the drive housing **551** is not affected, and components such as the side brush drive motor **552** are not affected. The fixing glue may be connected between the motor fixing part **555** and the second drive housing **5512** by filling glue. The fixing glue may be, but is not limited to, two-liquid mixed hardening glue, photosensitive glue, and the like. It should be noted that a related structure of the auxiliary drive assembly **550** is also applicable to other drive assemblies of the cleaning device **1000**.

[0133] FIG. **15** is a schematic structural view of the cleaning device according to a third embodiment of the present disclosure. The cleaning device **1000** includes the cleaning device body **100** and a movement drive assembly (not shown). The movement drive assembly (not shown) is provided at the cleaning device body **100**. The movement drive assembly is connected to the first auxiliary cleaning assembly **510**, and is configured to actively drive the first auxiliary cleaning assembly **510** to telescopically move relative to the cleaning device body **100**. In other words, under the action of the movement drive assembly, the first auxiliary cleaning assembly **510** may move between a first position and a second position. For ease of description, the first position may be defined as a position at which the first auxiliary cleaning assembly **510** performs a retraction movement to an extreme position along a direction close to the cleaning device body **100**. The second position may be defined as a position at which the first auxiliary cleaning assembly **510** performs an extension movement to an extreme position along a direction away from the cleaning device body **100**. It should be understood that the first auxiliary cleaning assembly **510** may further move to a third position between the first position and the second position.

[0134] In an embodiment, the first auxiliary cleaning assembly **510** may passively move between the first position and the second position. For example, an initial position at which the first auxiliary cleaning assembly **510** is located is the second position. When the cleaning device **1000** is in contact with an obstacle, such as a wall, during moving, the obstacle can squeeze the first auxiliary cleaning assembly **510** to move from the second position to the first position. When the cleaning device **1000** is separated from the obstacle, the first auxiliary cleaning assembly **510** returns to the second position under the action of a reset assembly. For example, the reset assembly may be an elastic mechanism, a stepless rebound mechanism, or the like. When the cleaning device **1000** moves normally, the first auxiliary cleaning assembly **510** is located at the second position under the action of the reset assembly. When the cleaning device **1000** is in contact with the obstacle, especially in a case where the first auxiliary cleaning assembly **510** is in contact with the obstacle, an action force of the obstacle applied to the first auxiliary cleaning assembly **510** overcomes an action force of the reset assembly, so that the first auxiliary cleaning assembly **510** is retracted toward the cleaning device body **100**, that is, the first auxiliary cleaning assembly **510** moves from the second position to the third position or the first position. When the cleaning device **1000** moves away from the obstacle again, the first auxiliary cleaning assembly **510** returns to the second position again under the action force of the reset assembly, that is, the first auxiliary cleaning assembly **510** moves from the first position or the third position to the second position.

[0135] In some embodiments, the movement drive assembly and the reset assembly cooperate with each other, so that the first auxiliary cleaning assembly **510** moves between the first position and the second position. A specific scenario and a manner are not limited herein.
[0136] In the present disclosure, the first auxiliary cleaning assembly **510** is movably connected to the cleaning device body **100**, and the first auxiliary cleaning assembly **510** may be driven by the movement drive assembly of the cleaning device **1000** to telescopically move. In this way, the first auxiliary cleaning assembly **510** has more flexibility to perform all-round cleaning on a pool surface or the water in the pool in different directions and at different distances, so that the movement of the cleaning device **1000** can be reduced, thereby improving the cleaning efficiency. A movement track that the first auxiliary cleaning assembly **510** is driven by the movement drive assembly to move between the first position and the second position may be a straight-line track, a continuous curved-line track, a discontinuous broken-line track, or the like. This is not limited herein.
[0137] In some embodiments, at the first position, that is, when the first auxiliary cleaning assembly **510** is extremely retracted, the first auxiliary cleaning assembly **510** is entirely located within the contour of the cleaning device body **100**, or the first auxiliary cleaning assembly **510** is at least partially located within the contour range of the cleaning device body **100**. The first position may be a position at which the movement drive assembly drives the first auxiliary cleaning assembly **510** to retract or a position at which the movement drive assembly does not drive the first auxiliary cleaning assembly **510** to extend. For example, the first position is a position at which the movement drive assembly drives the first auxiliary cleaning assembly **510** to retract along the direction close to the cleaning device body **100**. For another example, the first position is a position at which the movement drive assembly does not drive the first auxiliary cleaning assembly **510** to extend. In this case, the first position is also an initial position at which the first auxiliary cleaning assembly **510** is located.
[0138] At the second position, that is, when the first auxiliary cleaning assembly **510** extremely extends, at least a portion of the first auxiliary cleaning assembly **510** is located outside the contour of the cleaning device body **100**. The second position may be a position at which the movement drive assembly drives the first auxiliary cleaning assembly **510** to extend or a position at which the movement drive assembly does not drive the first auxiliary cleaning assembly **510** to retract. For example, the second position is a position at which the movement drive assembly drives the first auxiliary cleaning assembly **510** to extend along the direction away from the cleaning device body **100**. For another example, the second position is a position at which the movement drive assembly does not drive the first auxiliary cleaning assembly **510** to retract. In this case, the second position is an initial position at which the first auxiliary cleaning assembly **510** is located.
[0139] The first auxiliary cleaning assembly **510** moves from the first position to the second position, that is, the first auxiliary cleaning assembly **510** moves along the direction away from the cleaning device body **100**, which may be defined as an extended state. The first auxiliary cleaning assembly **510** moves from the second position to the first position, that is, the first auxiliary cleaning assembly **510** moves along the direction close to the cleaning device body **100**, which may be defined as a retracted state.
[0140] In some embodiments, as shown in FIG. **16**, the movement drive assembly may include a connection portion **530** and a first drive assembly (not shown). The first auxiliary cleaning assembly **510** is connected to the cleaning device body **100** through the connection portion **530**. The first drive assembly is connected to the connection portion **530**, and is configured to drive the first auxiliary cleaning assembly **510** to telescopically move relative to the cleaning device body **100**.
[0141] In some embodiments, as shown in FIG. **17**, the connection portion **530** includes a fixed portion **531** and a telescopic part **532**. The fixed portion **531** is fixedly connected to the cleaning device body **100**. One end of the telescopic part **532** is connected to the fixed portion **531**, and the

other end of the telescopic part **532** is connected to the first auxiliary cleaning assembly **510**. The telescopic part **532** may telescopically move relative to the fixed portion **531**. The first drive assembly includes a first power source (not shown). The first power source is provided at a joint between the fixed portion **531** and the telescopic part **532**. The first power source is configured to drive the connection portion **530** to telescopically move, to drive the first auxiliary cleaning assembly **510** to telescopically move. It may be understood that the first power source may be a motor, a cylinder, or the like. This is not limited herein.

[0142] In some other embodiments, the first auxiliary cleaning assembly **510** is movably connected to the movement drive assembly. The first drive assembly includes a first transmission mechanism (not shown) and the first power source. An input end of the first transmission mechanism is connected to the first power source. An output end of the first transmission mechanism is connected to the first auxiliary cleaning assembly **510**. The first power source is configured to provide power for the first transmission mechanism, so that the first transmission mechanism can drive the first auxiliary cleaning assembly **510** to telescopically move relative to the cleaning device body **100** and the connection portion **530**.

[0143] For example, the first transmission mechanism and the first power source may be provided at an end of the connection portion **530**, and the end is connected to the first auxiliary cleaning assembly **510**. The first transmission mechanism and the first power source may be configured to control the first auxiliary cleaning assembly **510** to telescopically move. The first transmission mechanism may include a turbine transmission mechanism and a gear transmission mechanism. For example, as shown in FIG. **18**, the first transmission mechanism includes an oscillating gear **541**, a worm gear **542**, a worm **543**, and a transmission gear **544**. The worm **543** is fixedly connected to an output end of the first power source. The worm **543** is engaged with the worm gear **542**. The worm gear **542** is fixedly connected to the transmission gear **544** through a concentric shaft. The transmission gear **544** is engaged with the oscillating gear **541**. The oscillating gear **541** serves as the output end of the first transmission mechanism, and is configured to drive a component connected to the output end of the first transmission mechanism to telescopically move. It may be understood that the first transmission mechanism may include a transmission mechanism other than the turbine transmission mechanism and the gear transmission mechanism. This is not limited herein.

[0144] In addition, the component connected to the output end of the first transmission mechanism may be the first auxiliary cleaning assembly **510**. The first auxiliary cleaning assembly **510** is eccentrically connected to the oscillating gear **541** through a rotating shaft. The oscillating gear **541** and the rotating shaft eccentrically oscillate to drive the first auxiliary cleaning assembly **510** to extend along the direction away from the cleaning device body **100**, so that the first auxiliary cleaning assembly **510** at least partially extends out of the cleaning device body **100**, or to drive the first auxiliary cleaning assembly **510** to retract along the direction close to the cleaning device body **100**, so that the first auxiliary cleaning assembly **510** is at least partially retracted into the cleaning device body **100**.

[0145] In some other embodiments, a first end of the connection portion **530** is connected to the first auxiliary cleaning assembly **510**. The first drive assembly includes the first transmission mechanism and the first power source. The input end of the first transmission mechanism is connected to the first power source. The output end of the first transmission mechanism is connected to a second end of the connection portion **530** or a component located between the cleaning device body **100** and the second end of the connection portion **530**. The first power source is configured to provide power for the first transmission mechanism, so that the first transmission mechanism drives the connection portion **530** and the first auxiliary cleaning assembly **510** to telescopically move relative to the cleaning device body **100**. The first transmission mechanism may control a component connected to the first transmission mechanism to rotate or translate, so that the first auxiliary cleaning assembly **510** can telescopically move relative to the cleaning

device body **100**.
[0146] In some embodiments, the movement drive assembly includes at least one group of second drive assemblies. Each second drive assembly is configured to drive the first auxiliary cleaning assembly **510** to rotate relative to the cleaning device body **100**, so that the first auxiliary cleaning assembly **510** can be switched between the first position and the second position.
[0147] The second drive assembly may include a second transmission mechanism and a second power source. The second power source is connected to an input end of the second transmission mechanism, and configured to provide power for the second transmission mechanism, so that the second transmission mechanism can directly or indirectly drive the first auxiliary cleaning assembly **510** to rotate. The second power source may be a motor, a cylinder, or the like. This is not limited herein.
[0148] In an embodiment, the first end of the connection portion **530** is connected to the first auxiliary cleaning assembly **510**. The at least one group of second drive assemblies includes a first group of second drive assemblies. The first end of the connection portion **530** is connected to the first auxiliary cleaning assembly **510**. Each second drive assembly in the first group of second drive assemblies is connected to the cleaning device body **100** and the second end of the connection portion **530**, and configured to drive the connection portion **530** to rotate around a first direction shaft **2**, so that the first auxiliary cleaning assembly **510** is indirectly driven to rotate around the first direction shaft **2**. The first direction shaft **2** may be a straight-line rotation shaft **512**. The straight-line rotation shaft **512** may be vertically disposed, so that the connection portion **530** can rotate in a horizontal direction, as shown in FIG. **15**. Alternatively, the straight-line rotation shaft **512** may be horizontally disposed, so that the connection portion **530** can rotate in a vertical direction. The first direction shaft **2** may alternatively be a spherical rotation shaft **512**, so that the connection portion **530** may rotate at any angle.
[0149] In another embodiment, the at least one group of second drive assemblies includes a second group of second drive assemblies. As shown in FIG. **16**, the first end of the connection portion **530** is connected to the first auxiliary cleaning assembly **510** through each second drive assembly in the second group of second drive assemblies. Each second drive assembly in the second group of second drive assemblies is configured to drive the connection portion **530** to rotate around a second direction shaft **3**, so that the first auxiliary cleaning assembly **510** is directly driven to rotate around the second direction shaft **3**. The second direction shaft **3** may be a straight-line rotation shaft **512**, a spherical rotation shaft **512**, or the like. This is not limited herein.
[0150] In another embodiment, the first auxiliary cleaning assembly **510** is movably connected to the cleaning device body **100**. The at least one group of second drive assemblies includes the first group of second drive assemblies and the second group of second drive assemblies. With reference to FIG. **15** and FIG. **16**, the first end of the connection portion **530** is connected to the first auxiliary cleaning assembly **510**. Each second drive assembly in the first group of second drive assemblies is connected to the cleaning device body **100** and the second end of the connection portion **530**, and configured to drive the connection portion **530** to rotate around the first direction shaft **2**. One end of each second drive assembly in the second group of second drive assemblies is connected to the first auxiliary cleaning assembly **510**, and the other end thereof is connected to the connection portion **530**, to drive the connection portion **530** to rotate around the second direction shaft **3**, to implement multi-stage rotation control on the first auxiliary cleaning assembly **510**. This increases a cleaning range of the first auxiliary cleaning assembly **510**.
[0151] For example, the first direction shaft **2** is the straight-line rotation shaft **512** and disposed vertically, and the second direction shaft **3** is the straight-line rotation shaft **512** and disposed horizontally. Therefore, when the first auxiliary cleaning assembly **510** performs cleaning, each second drive assembly in the first group of second drive assemblies may first drive the connection portion **530** to rotate around the first direction shaft **2** in the horizontal direction. After the first auxiliary cleaning assembly **510** reaches a preset position, each second drive assembly in the

second group of second drive assemblies drives the first auxiliary cleaning assembly **510** to rotate around the second direction shaft **3** in the vertical direction, to clean a to-be-cleaned object in the vertical direction. In addition, if the cleaning device **1000** is trapped during performing cleaning, the first auxiliary cleaning assembly **510** and the connection portion **530** may rotate and swing flexibly, so that the cleaning device **1000** can escape from the trap more easily. In addition, the second drive assembly and the first drive assembly may be the same assembly.

[0152] It may be understood that, when the first group of second drive assemblies and the second group of second drive assemblies are simultaneously configured to control the first auxiliary cleaning assembly **510** to rotate, the connection portion **530** is first controlled to rotate in the vertical direction, and then the first auxiliary cleaning assembly **510** is controlled to rotate in the horizontal direction, or the connection portion **530** is first controlled to rotate in the horizontal direction, and then the first auxiliary cleaning assembly **510** is controlled to rotate in the vertical direction. A scheme of multi-directional rotation control on the first auxiliary cleaning assembly **510** is not specifically limited herein.

[0153] In some embodiments, to improve flexibility of the first auxiliary cleaning assembly **510** and increase the cleaning range of the cleaning device **1000**, the first drive assembly and the second drive assembly may be configured to simultaneously control the connection portion **530** to rotate and telescopically move. In this case, the component connected to the output end of the first transmission mechanism and located between the second end of the connection portion **530** and the cleaning device body **100** is the second drive assembly.

[0154] In addition, a third drive assembly (not shown) may be provided at the movement drive assembly, so that the first auxiliary cleaning assembly **510** can conveniently clean the pool surface, the to-be-cleaned object, or the water in the pool. The third drive assembly is connected to the first auxiliary cleaning assembly **510**, and configured to drive, when the first auxiliary cleaning assembly **510** needs to be in operation, the first auxiliary cleaning assembly **510** rotates around its own axis, to scrub and clean the pool surface, the to-be-cleaned object, or the water in the pool.

[0155] In some embodiments, there are several first auxiliary cleaning assemblies **510**. At least first auxiliary cleaning assembly **510** may also be configured to escape from the trap. For example, when the cleaning device **1000** is trapped by aquatic plants in the pool, the first auxiliary cleaning assembly **510** can rotate and telescopically move to escape from the aquatic plants, or the first auxiliary cleaning assembly **510** may be retracted into the cleaning device **1000**, to reduce a width of the cleaning device **1000**, so that the cleaning device **1000** passes through easily.

[0156] In some embodiments, when the debris inlet **413** is provided at the first side portion **1011** of the cleaning device body **100**, the first auxiliary cleaning assembly **510** may alternatively be provided at the bottom of the cleaning device body **100**. As shown in FIG. **19**, the first auxiliary cleaning assembly **510** is disposed at the bottom of the cleaning device body **100** and can extend out of the bottom of the cleaning device body **100**. In addition, the first auxiliary cleaning assembly **510** may be obliquely disposed relative to a center of the debris inlet **413** or may be substantially parallel to the debris inlet **413**, to guide a water flow and debris, which are located below the debris inlet **413**, to the debris inlet **413**. In addition, when the first auxiliary cleaning assembly **510** extends out of the contour of the cleaning device body **100**, the first auxiliary cleaning assembly **510** can scrub a contacted target object.

[0157] In other embodiments, for the multi-functional cleaning device, the debris inlet **413** is provided at the bottom of the cleaning device body **100**. To increase the cleaning range of the debris inlet **413**, the at least one first auxiliary cleaning assembly **510** may alternatively be provided at the bottom of the cleaning device body **100** and located at two sides of the debris inlet **413**, to increase the cleaning range of the debris inlet **413**. In this case, the first auxiliary cleaning assembly **510** may alternatively incline toward the debris inlet **413**, to agitate the water flow and the stains located outside the cleaning range of the debris inlet **413** and guide the water flow and the stains to the debris inlet **413**.

[0158] In addition, when the debris inlet **413** is provided at the bottom of the cleaning device body **100**, the at least one first auxiliary cleaning assembly **510** is provided at the second side portion **1012** and/or the third side portion **1013** of the cleaning device body **100**. An end of the connection portion **530** is away from the cleaning device body **100**, and the end extends to the bottom of the cleaning device body **100**, so that the first auxiliary cleaning assembly **510** disposed at the end of the connection portion **530** and away from the cleaning device body **100** is close to the bottom of the cleaning device body **100**. In addition, the first auxiliary cleaning assembly **510** may incline toward the debris inlet **413** provided at the bottom of the cleaning device body **100**, to guide the water flow and the stains located outside the bottom of the cleaning device body **100** to the debris inlet **413**.

[0159] In an embodiment, the first auxiliary cleaning assembly **510** is a component having a suction function. The first auxiliary cleaning assembly **510** may suck the water flow and the stains located beyond the cleaning range of the debris inlet **413**, and guide the water flow and the stains to the debris inlet **413**.

[0160] In another embodiment, as shown in FIG. **21**, FIG. **22**, FIG. **23**, and FIG. **24**, the auxiliary cleaning mechanism **500** may include a second auxiliary cleaning assembly **520**. The second auxiliary cleaning assembly **520** includes a water spray assembly **521**. The water spray assembly **521** is provided at the cleaning device body **100**, and configured to spray a water flow to a to-be-cleaned region, to at least scrub the to-be-cleaned region or guide at least a part of debris at the to-be-cleaned region to the working region of the debris inlet **413**.

[0161] For the multi-functional cleaning device, the debris inlet **413** may be provided at the bottom of the cleaning device body **100**, the first side portion **1011**, the second side portion **1012**, the third side portion **1013**, the top of the cleaning device body **100**, or the like. The water spray assembly **521** is provided with one spout **5211** or a plurality of spouts **5211**, so that the water flow can be sprayed through the spout **5211**. Specifically, the spout **5211** of the water spray assembly **521** may be provided at an edge of the cleaning device body **100**. The water flow is sprayed to the side or the front of the cleaning device body **100** through the spout **5211**.

[0162] The water flow sprayed through the spout **5211** may draw the debris to the working region of the debris inlet **413** of the cleaning device **1000** in at least one of the following manners, such as agitation, reflection performed by the pool wall, and water flow guidance. In this way, the debris inlet **413** can draw the debris into the cleaning device body **100**.

[0163] In an embodiment, when the cleaning device **1000** is close to a pool edge, for example, when the cleaning device **1000** moves along the pool edge through the moving mechanism **300**, the water flow is sprayed to the wall of the pool through the at least one spout **5211** (for example, the water flow may be sprayed to the side or the front of the cleaning device body **100**, so that the water flow may be sprayed to the wall of the pool). In this way, the water flow is sprayed to the wall of the pool through the spout **5211** to scrub the wall of the pool, and debris on the wall of the pool and debris between the cleaning device body **100** and the wall of the pool are pushed toward the cleaning device **1000** through reflection of the water flow performed by the wall of the pool, so that the cleaning device **1000** can suck the debris through the debris inlet **413**. In addition, when the water flow is sprayed toward the wall of the pool through the spout **5211**, agitation formed by the water flow sprayed through the spout **5211** may also have a gathering effect on the debris, thereby further facilitating sucking the debris inlet **413**.

[0164] In another embodiment, when the cleaning device **1000** performs water surface cleaning, the water flow may be sprayed to the side and/or the front of the cleaning device body **100** through the at least one spout **5211**. In this case, agitation is formed by the water flow sprayed through the spout **5211**, so that at least a part of debris outside the working region of the debris inlet **413** can be guided to the working region of the debris inlet **413**. This increases the cleaning range of the cleaning device **1000** and improves the overall cleaning efficiency.

[0165] In an embodiment, the cleaning device **1000** further includes a water blocking structure **104**

provided at a route where the water flow is sprayed through the spout **5211**. The water blocking structure **104** can block a part of sprayed water flow with a high flow velocity, to avoid the following case: the part of the water flow may push the debris away from the cleaning device **1000**, and a part of the debris cannot be sucked by the debris inlet **413**. In addition, the water blocking structure **104** can change a direction of the sprayed water flow, to form water flow agitation for gathering floating debris located beyond the cleaning range of the debris inlet **413** to the cleaning range.

[0166] In an embodiment, the water flow may be sprayed to the debris inlet **413** through the spout **5211** of the water spray assembly **521**, so that the debris can be driven to the working region of the debris inlet **413** under the guidance of the water flow sprayed through the spout **5211**. For example, the spout **5211** of the water spray assembly **521** may be provided at the outer side portion of the cleaning device body **100**, and the debris inlet **413** is provided at the front portion of the cleaning device body **100**. When the spout **5211** needs to be in operation, the spout **5211** faces the debris inlet **413** to spray the water flow to the debris inlet **413**. In this case, the water flow sprayed through the spout **5211** can have a function of gathering the debris, so that the debris can be gathered within the working region of the debris inlet **413**.

[0167] In an embodiment, the position of the spout **5211** may include a first movement position and a second movement position. The spout **5211** can move between the first movement position and the second movement position. For example, the spout **5211** may rotate around an axis in a specific direction between the first movement position and the second movement position. The specific direction may be the horizontal direction, the vertical direction, or the like. The first movement position is a position at which the water flow is sprayed to the debris inlet **413** through the spout **5211**, that is, when the water flow needs to be sprayed to the debris inlet **413** through the spout **5211**, the spout **5211** moves to the first movement position to spray the water flow. The second movement position is a position different from the first movement position. For example, in a case where the spout **5211** may rotate in the vertical direction, if the first movement position is close to the top of the cleaning device body **100**, the second movement position may be close to the bottom of the cleaning device body **100**. With reference to FIG. **23** and FIG. **24**, the spout **5211** can rotate horizontally around the cleaning device body **100**, the first movement position is a position away from the cleaning device body **100**, and the second movement position is a position close to the cleaning device body **100**. When the water flow does not need to be sprayed to the debris inlet **413** through the spout **5211**, the spout **5211** is located at the second movement position. When the water flow needs to be sprayed to the debris inlet **413** through the spout **5211**, the spout **5211** rotates to the first movement position, so that the spout **5211** faces the debris inlet **413** and is configured to spray the water flow to the debris inlet **413**. In this case, the water flow sprayed through the spout **5211** can have a certain effect of gathering the debris, so that the debris can be gathered within the working region of the debris inlet **413**, and the debris can be conveniently sucked through the debris inlet **413**. In addition, the spout **5211** may be configured movably. For example, the spout **5211** can be retracted into the cleaning device body **100** when the spout **5211** is not in operation, so that the spout **5211** can be prevented from obstructing the operation of the cleaning device **1000** when the spout **5211** does not need to be in operation. In addition, when the water flow needs to be sprayed through the spout **5211** in directions other than a direction toward the debris inlet **413**, the spout **5211** may move to the second movement position and is configured to spray the water flow without being provided with a plurality of spouts **5211**.

[0168] In an embodiment, the water spray assembly **521** may include a water spray part **5212** and a power unit (not shown). The spout **5211** is provided at the water spray part **5212**. The power unit is configured to drive the spout **5211** of the water spray part **5212** to spray the water flow. The power unit may be an original apparatus of the cleaning device **1000**, such as the main water pump, or a newly provided apparatus. The newly provided apparatus may be a newly provided water pump, a plunger pump, a diaphragm pump, or the like. The power unit is configured to provide power for

the spout **5211** to spray the water. A single spout **5211** may correspond to a single power unit, or a plurality of spouts **5211** may correspond to a same power unit. The water spray part **5212** may be a spray rod or other forms, and the form of the water spray part **5212** is not limited herein.

[0169] There may be one or more water spray parts **5212**. One or more spouts **5211** are provided at each water spray part **5212**. Different water spray parts **5212** may operate simultaneously or independently. Different spouts **5211** disposed at a same water spray part **5212** may also operate simultaneously or independently.

[0170] In an embodiment, the spout **5211** of the water spray part **5212** can rotate, and the cleaning device **1000** further includes a rotating assembly (not shown). The spout **5211** of the water spray part **5212** may be rotated by the rotating assembly, so that the spout **5211** is oriented toward a target orientation.

[0171] In an embodiment, there may be a plurality of water spray parts **5212**, and the plurality of water spray parts **5212** are provided on a left side and a right side of the cleaning device body **100** respectively. At least one water spray part **5212** is disposed at each of the left side and the right side of the cleaning device body **100**, and an orientation of the spout **5211** of the water spray part **5212** disposed at the left side is different from that of the spout **5211** of the water spray part **5212** disposed at the right side. For another example, the plurality of water spray parts **5212** are provided on a same side of the cleaning device body **100**, such as a front side or the right side of the cleaning device body **100**. Orientations of the spouts **5211** disposed at the plurality of water spray parts **5212** are different from each other. In this way, a water spray part **5212** provided with a spout **5211** of a matched orientation can be selected based on an attitude of the cleaning device **1000** for spraying water.

[0172] In an embodiment, two water spray parts **5212** are disposed at each of two sides of the cleaning device **1000**. The two water spray parts **5212** disposed at each of two sides are an upper water spray part and a lower water spray part. Correspondingly, the spout **5211** of the upper water spray part is an upper spout, and the spout **5211** of the lower water spray part is a lower spout. The upper spout and the lower spout orient toward the front or at a certain outward expansion angle relative to the front. For example, when the cleaning device **1000** performs water surface cleaning, the upper spouts **5211** disposed at two sides may be selected to clean the pool wall at the waterline. When the cleaning device **1000** performs underwater cleaning, the lower spouts **5211** disposed at two sides may be selected to clean the bottom wall or the wall of the pool.

[0173] In an embodiment, when the cleaning device **1000** performs water surface cleaning, the spout **5211** currently operating at least needs to be provided at a position of the cleaning device body **100**, and the position is close to the water surface. In this case, the water flow sprayed through the spout **5211** can clean the water surface and the pool wall at the waterline. At the same time, the cleaning device **1000** may move on the water surface under the action of the moving mechanism **300**, so that the cleaning device **1000** can movably clean the water surface.

[0174] In some embodiments, when the cleaning device **1000** performs underwater cleaning, the at least one spout **5211** currently operating needs to be provided at the cleaning device body **100**, and inclines toward the bottom of the pool. In this case, the water is sprayed through the spout **5211** to clean small debris at a specific height position in the water, a specific height position on the side wall of the pool, the bottom wall of the pool, and a corner between the pool bottom and the pool side wall.

[0175] FIG. **25** is a first schematic structural view of a filtering box of the cleaning device according to the present disclosure. With reference to FIG. **1** and FIG. **2**, in some embodiments, the first side portion **1011** of the cleaning device body **100** is provided with an accommodating opening **102**, and the accommodating groove **108** is formed inside the cleaning device body **100**. The first side portion **1011** is a side portion facing the forward direction of the cleaning device body **100**. A fourth side portion **1014** and the first side portion **1011** are disposed opposite to each other, that is, the fourth side portion **1014** is the rear portion of the cleaning device body **100**. The second side

portion **1012** and the third side portion **1013** are disposed opposite to each other. The accommodating opening **102** may be provided at least one of the first side portion **1011**, the second side portion **1012**, the third side portion **1013**, and the fourth side portion **1014**. In other words, a position at which the accommodating port **102** is provided may be determined based on an actual requirement. For the water surface cleaning device, the main cleaning mechanism **400** includes at least the filtering box **410** at least partially accommodated in the accommodating groove **108**. The main cleaning mechanism **400** may be disassembled through the accommodating opening **102**, that is, the filtering box **410** may be disassembled through the accommodating opening **102** provided at the side portion of the cleaning device **1000**. Compared with an existing water surface cleaning robot where the top cover needs to be turned over to disassemble the filtering box to mount and remove the filtering box, in this embodiment, the filtering box **410** can be conveniently mounted and removed by using the handle **414** provided at the main cleaning mechanism **400** from the outer side portion of the cleaning device body **100**, so that usage experience is improved. In addition, the top cover **107** does not need to be frequently flipped and opened. This improves stability of the solar panel (not shown) and various wires of the solar mechanism **600** mounted on the top cover **107** in an associated manner, thereby improving a service life and reliability of the solar mechanism **600**. For the multi-functional cleaning device, the main cleaning mechanism **400** also includes at least the filtering box **410** at least partially accommodated in the accommodating groove **108**. The accommodating opening **102** may be provided at the top of the cleaning device **1000**. The main cleaning mechanism **400** may be disassembled through the accommodating opening **102**. In this case, the top cover **107** may be provided at the accommodating opening **102**, and the filtering box **410** may be mounted and removed by opening the top cover **107**.

[0176] The position of the accommodating opening **102** of the water surface cleaning device may be the same as the position of the debris inlet **413**. For example, the accommodating opening **102** is provided at the first side portion **1011**, the accommodating opening **102** at least partially overlaps with the debris inlet **413**, and at least a part of the debris inlet **413** is located within the range of the accommodating opening **102**. In other words, the accommodating opening **102** and the debris inlet **413** are both disposed at the first side portion **1011**. A user may mount the main cleaning mechanism **400** in the accommodating groove **108** along the accommodating opening **102** of the first side portion **1011**. Based on the above position limitation, in a process of removing the filtering box **410**, the debris is located at the bottom of the filtering box **410** due to gravity, to prevent the debris from being regurgitated. In addition, the adjustment mechanism **200**, the moving mechanism **300**, and other related mechanism can be conveniently mounted on the cleaning device **1000**. Certainly, the position of the accommodating opening **102** may be different from the position of the debris inlet **413**. The liquid inlet is provided at the first side portion **1011** and communicates with the debris inlet **413**. The accommodating opening **102** may be located at one of the second side portion **1012**, the third side portion **1013**, and the fourth side portion **1014**, that is, the user may remove the main cleaning mechanism **400** from the accommodating groove **108** along the accommodating opening **102**. When the accommodating opening **102** is located at the fourth side portion **1014**, a related anti-regurgitation assembly **470** may be added at the debris inlet **413**, so that the debris and the like can be prevented from flowing out from the debris inlet **413** in the process of removing the filtering box **410**.

[0177] For the multi-functional cleaning device, the accommodating opening **102** is provided at the top, and the debris inlet **413** of the main cleaning mechanism **400** includes at least a debris inlet **413** for water surface cleaning and a debris inlet **413** for underwater cleaning. The debris inlet **413** for water surface cleaning may be provided at the side portion of the cleaning device **1000**, such as the first side portion **1011**. The debris inlet **413** for underwater cleaning may be provided at the bottom of the cleaning device **1000** and face a to-be-cleaned surface, so that the debris inlet **413** can conveniently cooperate with the to-be-cleaned surface to form a negative pressure area.

[0178] In some embodiments, the filtering box **410** may be disposed at the accommodating groove

108 in a pull-out manner. For example, for the water surface cleaning device **1000**, the filtering box **410** may be pulled in a direction substantially parallel to the reference plane **1**, that is, the filtering box **410** may be pulled in a direction substantially parallel to the solar panel of the solar mechanism **600**. For the multi-functional cleaning device, the filtering box **410** may be pulled in a direction at an angle relative to the reference plane **1**. When the filtering box **410** is mounted at the accommodating groove **108**, the filtering box **410** may be locked to the cleaning device body **100**, so that a risk that the filtering box **410** is loosened and falls off can be reduced. When the filtering box **410** needs to be removed, the filtering box **410** and the cleaning device body **100** are unlocked to remove the filtering box **410**. The locking manner may be, but is not limited to, a clamping manner, an inserting manner, or the like. The pull-out manner may be, but is not limited to, a sliding manner, or the like.

[0179] As shown in FIG. **26** to FIG. **28**, in an embodiment, a locking mechanism **420** is provided between the filtering box **410** and the cleaning device body **100**. When the filtering box **410** is mounted in the accommodating groove **108** through the accommodating opening **102**, the locking mechanism **420** is in a locked state. In this case, the filtering box **410** is locked to the cleaning device body **100**, so that the risk that the filtering box **410** is loosened and falls off when the cleaning device **1000** is in operation can be reduced. When the filtering box **410** needs to be removed from the accommodating groove **108**, the locking mechanism **420** is in an unlocked state. In this case, the filtering box **410** and the cleaning device body **100** are unlocked, so that the filtering box **410** can be removed from the accommodating groove **108**. The locking mechanism **420** may be, but is not limited to, an elastic locking mechanism, a magnetic attraction locking mechanism, an inserting locking mechanism, or the like, provided that the filtering box **410** can be releasably locked to the cleaning device body **100**.

[0180] In an embodiment, the locking mechanism **420** includes a locking assembly **421** and a locking groove **422**. One of the filtering box **410** and the cleaning device body **100** is provided with the locking assembly **421**, and the other one of the filtering box **410** and the cleaning device body **100** is provided with the locking groove **422**. The locking assembly **421** may be releasably locked to the locking groove **422**. For example, the locking assembly **421** is disposed at the cleaning device body **100**, and the locking groove **422** is disposed at the filtering box **410**, or the locking assembly **421** is disposed at the filtering box **410**, and the locking groove **422** is disposed at the cleaning device body **100**.

[0181] In an embodiment, the locking assembly **421** includes at least a first locking part **4211**, a first elastic part **4212**, and a first pressing part **4213**. The first elastic part **4212** is provided between a top end of the first locking part **4211** and the cleaning device body **100**. The first locking part **4211** includes a first locking portion **42111**. The first locking portion **42111** may be releasably locked to the locking groove **422**. When an external force is applied to the first pressing part **4213**, the first pressing part **4213** acts on the first locking part **4211**, the first locking part **4211** is lifted and acts on the first elastic part **4212**, and the first locking portion **42111** of the first locking part **4211** is disconnected from the locking groove **422**, so that the filtering box **410** can be removed from the accommodating groove **108**. When the external force is not applied, the first pressing part **4213** is reset under a restoring force of the first elastic part **4212**. At the same time, the first locking part **4211** is lowered under the restoring force of the first elastic part **4212**, and the first locking portion **42111** of the first locking part **4211** is locked to the locking groove **422**, so that the filtering box **410** can be locked to the cleaning device body **100** and located in the accommodating groove **108**. The first elastic part **4212** may be, but is not limited to, a compression spring.

[0182] In an embodiment, an end of the first pressing part **4213** faces the first locking part **4211**, and the end is provided with a pressing bevel **42131**. The pressing bevel **42131** is configured obliquely. The first pressing part **4213** is provided with the pressing bevel **42131**, so that the first pressing part **4213** can easily act on the first locking part **4211**. This reduces friction and improves smoothness of the first pressing part **4213** acting on the first locking part **4211**, thereby improving

usage experience.

[0183] In another embodiment, an end of the first pressing part **4213** faces the first locking part **4211**, and the end is provided with a first pressing guide post **42132** and a pressing buckle **42133**. The first pressing guide post **42132** is movably inserted into the cleaning device body **100**, and configured to guide the first pressing part **4213** to reduce pressing deviation of the first pressing part **4213**. There may be one, two, or a plurality of first pressing guide posts **42132**. The pressing buckle **42133** is disposed at a periphery of the first pressing part **4213**, and plays a clamping role. When the first pressing part **4213** is reset under the restoring force of the first elastic part **4212**, the pressing buckle **42133** is clamped to the cleaning device body **100**, to reduce a risk that the pressing buckle **42133** falls out of the cleaning device body **100**. There may be one, two, or a plurality of pressing buckles **42133**.

[0184] FIG. **42***a* is a first schematic cross-sectional view of the cleaning device according to a ninth embodiment of the present disclosure. FIG. **42***b* is a partial cross-sectional view of the cleaning device according to the ninth embodiment of the present disclosure. As shown in FIG. **42***a* and FIG. **42***b*, in an embodiment, the locking assembly **421** includes at least a second locking part **4214**. The second locking part **4214** is disposed on the filtering box **410**, for example, on the handle **414**. The second locking part **4214** includes a second locking portion **42141**. The second locking portion **42141** is releasably locked to the locking groove **422**. The cleaning device body **100** is provided with a locking groove **422**. The locking groove **422** includes at least a first position-limiting structure **4221** and a second position-limiting structure **4222**. At least one of the first position-limiting structure **4221** and the second position-limiting structure **4222** is a movable structure. In a specific embodiment, the first position-limiting structure **4221** is a fixed structure, and the second position-limiting structure **4222** is a movable structure. The second position-limiting structure **4222** may move between a fourth position and a fifth position. For ease of description, the fourth position may be defined as a position at which the second position-limiting structure **4222** moves to a limit of the second position-limiting structure **4222** in a direction close to the first position-limiting structure **4221**, and the fifth position may be defined as a position at which the second position-limiting structure **4222** moves to a limit of the second position-limiting structure **4222** in a direction away from the first position-limiting structure **4221**. It may be understood that the second position-limiting structure **4222** may further move to a sixth position between the fourth position and the fifth position. When the second position-limiting structure **4222** moves to the fifth position or the sixth position, the second locking portion **42141** may be disconnected from the locking groove **422**, so that the filtering box **410** can be removed from the accommodating groove **108**. When the second position-limiting structure **4222** moves to the fourth position or the sixth position, the second locking portion **42141** may be locked to the locking groove **422**, so that the filtering box **410** can be locked to the cleaning device body **100** and located in the accommodating groove **108**.

[0185] In a specific embodiment, the locking mechanism **420** further includes a second pressing part **423**. FIG. **43***a* is a schematic structural view of the second pressing part of the cleaning device according to the present disclosure. FIG. **43***b* is a first partial exploded view of the cleaning device according to the ninth embodiment of the present disclosure. As shown in FIG. **43***a* and FIG. **43***b*, an end of the second pressing part **423** faces the cleaning device body **100**, and the end is provided with a second pressing guide post **4231** and a pressing mating portion **4232**. The second pressing guide post **4231** is movably inserted into the cleaning device body **100** to play a guiding and position-limiting role for the second pressing part **423**, thereby reducing pressing deviation of the second pressing part **423**. There may be one, two, or more second pressing guide posts **4231**. Further, the cleaning device body **100** is further provided with a pressing fixing part **4233** mating with at least one second pressing guide post **4231**. The second pressing part **423** is fixed to the cleaning device body **100** by using the pressing fixing part **4233**. For example, the second pressing guide post **4231** may include a hollow structure. The pressing fixing part **4233** may be inserted into

the hollow structure of the second pressing guide post **4231** to fix the second pressing guide post **4231**, thereby fixing the second pressing part **423**. The pressing fixing part **4233** may be, but is not limited to, a screw, a buckle, or the like. In some embodiments, a second elastic part **4234** may be disposed between the second pressing guide post **4231** and the pressing fixing part **4233**, and the second elastic part **4234** is disposed on the second pressing part **423**. When an external force is applied to the second pressing part **423**, the second pressing guide post **4231** acts on the second elastic part **4234**, the second pressing part **423** moves toward a side of the cleaning device body **100**, and the second elastic part **4234** is compressed. The second pressing part **423** may be provided at a joint between the first side portion **1011** and the top of the cleaning device body **100**. This is not limited herein.

[0186] FIG. **43***c* is a first partial structural view of the cleaning device according to the ninth embodiment of the present disclosure. As shown in FIG. **43***c*, the locking mechanism **420** further includes at least one first transferring structure **424** and at least one second transferring structure **425** provided on the cleaning device body **100**. A first transferring end **4241** of the first transferring structure **424** may be in contact with the pressing mating portion **4232**, and a second transferring end **4242** of the first transferring structure **424** may be in contact with the second transferring structure **425**. When an external force is applied to the second pressing part **423**, the pressing mating portion **4232** acts on the first transferring end **4241** of the first transferring structure **424**, the second transferring end **4242** of the first transferring structure **424** acts on the second transferring structure **425**, and the second transferring structure **425** causes the second position-limiting structure **4222** to move toward the fifth position. When the external force is not applied, the second pressing part **423** is reset under a restoring force of the second elastic part **4234**, and at the same time, the second position-limiting structure **4222** moves toward the fourth position, so that the second transferring structure **425** is reset, thereby driving the first transferring structure **424** to be reset. The second transferring structure **425** and the second position-limiting structure **4222** may be an integral structure or may be connected in any manner. Both the pressing mating portion **4232** and the first transferring end **4241** may incline. This is not limited herein. In some embodiments, one of contact surfaces between the first transferring end **4241** and the pressing mating portion **4232** is a smooth surface, and the other is a non-smooth surface, to avoid the following case: Difficulty in pressing the second pressing part **423** is increased due to an increase in a friction force after the two surfaces are in contact with each other. In addition, possible abnormal noise caused during performing pressing can be avoided.

[0187] FIG. **43***d* is a second partial structural view of the cleaning device according to the ninth embodiment of the present disclosure. FIG. **43***e* is a third partial structural view of the cleaning device according to the ninth embodiment of the present disclosure. With reference to FIG. **43***d*, FIG. **43***e*, and FIG. **42***b*, in a specific embodiment, the cleaning device body **100** is further provided with a third position-limiting structure **4223**. There is a third elastic part **4251** between the third position-limiting structure **4223** and the second transferring structure **425**. When an external force is applied to the second pressing part **423**, the second transferring end **4242** of the first transferring structure **424** acts on the second transferring structure **425**, and the second transferring structure **425** acts on the third elastic part **4251**. For ease of description, a direction in which the fourth position faces the fifth position may be defined as a first direction, and a direction in which the fifth position faces the fourth position may be defined as a second direction. The second transferring structure **425** applies at least a force component in the first direction to the third position-limiting structure **4223** through the third elastic part **4251**. When the external force is not applied to the second pressing part **423**, a restoring force of the third elastic part **4251** has at least a force component in the second direction on the second position-limiting structure **4222**, so that the second position-limiting structure **4222** moves toward the fourth position. The second elastic part **4234** and the third elastic part **4251** may be, but are not limited to, a compression spring. The third position-limiting structure **4223** may be independently disposed or may be integrally formed with

any structure on the cleaning device body. This is not limited herein.

[0188] Refer to FIG. **43***c*, FIG. **43***d*, FIG. **43***e*, and FIG. **43***f*. FIG. **43***f* is a second partial exploded view of the cleaning device according to the ninth embodiment of the present disclosure. In a specific embodiment, there are two first transferring structures **424** and two second transferring structures **425**. One first transferring structure **424** cooperates with one second transferring structure **425**. One pair of the first transferring structure **424** and the second transferring structure **425** is close to the second side portion **1012**, and the other pair of the first transferring structure **424** and the second transferring structure **425** are close to the third side portion **1013**. The two pairs of first transferring structures **424** and second transferring structures **425** may be symmetrically disposed to respectively cooperate with different second position-limiting structures **4222**. For ease of description, a direction in which the third side portion **1013** faces the second side portion **1012** may be defined as a third direction, and a direction in which the second side portion **1012** faces the third side portion **1013** may be defined as a fourth direction. In some cases, the third direction and the fourth direction are both perpendicular to the second direction, that is, the third direction and the fourth direction are also perpendicular to the first direction. The first transferring structure **424** and the second transferring structure **425** that are close to the second side portion **1012** are used as an example for description. When an external force is applied to the second pressing part **423**, the pressing mating portion **4232** acts on the first transferring end **4241** and applies at least a force component in the third direction to the first transferring structure **424**. A third transferring end **4252** of the second transferring structure **425** is in contact with the second transferring end **4242**, and both the second transferring end **4242** and the third transferring end **4252** may incline, so that the second transferring end **4242** can apply at least a force component in the first direction to the third transferring end **4252**. In this way, the second transferring structure **425** can move in the first direction, and the second position-limiting structure **4222** can move in the first direction. When the external force is not applied, the second pressing part **423** is reset under the restoring force of the second elastic part **4234**, and the second transferring structure **425** moves in the second direction under the restoring force of the third elastic part **4251**, so that the second transferring structure **425** and the second position-limiting structure are reset. The third transferring end **4252** applies a force component in the fourth direction to the second transferring end **4242** to drive the first transferring structure **424** to be reset.

[0189] The second pressing part **423** has a surface approximately parallel to a moving direction of the second pressing part **423** and/or a surface approximately perpendicular to the moving direction of the second pressing part **423**. The surface approximately parallel to the moving direction of the second pressing part **423** is rubbed, and/or the surface approximately perpendicular to the moving direction of the second pressing part **423** is pressed, so that a force for the second pressing part **423** to move toward the cleaning device body **100** is applied to the second pressing part **423**. Further, as shown in FIG. **43***a* and FIG. **43***b*, the second pressing part **423** is provided with an anti-slip portion. The anti-slip portion may be provided on the surface approximately parallel to the moving direction of the second pressing part **423** to increase a friction force applied to the surface. This improves use convenience and effectiveness of the second pressing part **423**. A structure of the anti-slip portion may be determined based on an actual situation, provided that the anti-slip portion can implement an effect of increasing the friction force. The anti-slip portion may be, but is not limited to, several protruding points distributed on the surface of the second pressing part **423** at intervals.

[0190] In an embodiment, a sliding structure **430** is provided between a periphery of the filtering box **410** and an inner side wall of the accommodating groove **108**. The sliding structure **430** is disposed, so that the filtering box **410** can be mounted and removed smoothly. This improves usage experience. The sliding structure **430** may include a sliding rail **431** and a sliding groove (not shown), and the sliding rail **431** is slidably connected to the sliding groove. One of the periphery of the filtering box **410** and the inner side wall of the accommodating groove **108** is provided with the sliding rail **431**, and the other is provided with the sliding groove. Positions and quantities of the

sliding rail **431** and the sliding groove may be determined based on an actual requirement. This is not limited herein.

[0191] Specifically, the periphery of the filtering box **410** is provided with the sliding groove, and the inner side wall of the accommodating groove **108** is provided with the sliding rail **431**. Alternatively, in this embodiment, the periphery of the filtering box **410** is provided with the sliding rail **431**, and the inner side wall of the accommodating groove **108** is provided with the sliding groove. The sliding rail **431** is slidably connected to the sliding groove, so that the filtering box **410** can be mounted and removed more smoothly. In addition, the sliding rail **431** is provided at the periphery of the filtering box **410** to improve strength of the filtering box **410**. The sliding rail **431** is disposed outside a side wall of the filtering box **410**, and the side wall faces the second side portion **1012** and/or the third side portion **1013**.

[0192] In some embodiments, the main cleaning mechanism **400** further includes a handle **414**. The handle **414** is provided at the periphery of the filtering box **410**. The handle **414** is located on a side of the filtering box **410**, and the side of the filtering box **410** is provided with the debris inlet **413**. It is convenient for the user to mount and remove the filtering box **410** through the handle **414**. A position of the handle **414** corresponds to a position of the accommodating opening **102**. In this embodiment, the accommodating opening **102** is provided at the first side portion **1011**, and the handle **414** is disposed at the first side portion **1011**. At least a part of space in which the accommodating opening **102** is located may be configured to accommodate the handle **414**. The filtering box **410** may be pulled out by using the handle **414** in a direction substantially parallel to the forward direction of the cleaning device **1000**. As shown in FIG. **25**, at least two of the handle **414**, the debris inlet **413**, the roller brush, and the anti-regurgitation assembly **470** are located on a same side of the cleaning device body **100**.

[0193] In a specific embodiment, the filtering box **410** is further provided with a filtering box handle for a user to remove the filtering box **410**, and the filtering box handle and the handle **414** are located at different positions on the filtering box **410**. In another specific embodiment, the filtering box **410** is only provided with the handle **414**, that is, the filtering box **410** may be mounted, removed, and lifted by using the handle **414**.

[0194] In a specific embodiment, the cleaning device body **100** is further provided with a body handle for the user to lift the cleaning device body **100**, and the body handle and the handle **414** are located at different positions on the cleaning device body **100**. In another specific embodiment, when the filtering box **410** is mounted in the accommodating groove **108**, the handle **414** may serve as the body handle, that is, the cleaning device body **100** may be lifted by using the handle **414**.

[0195] Specifically, the locking mechanism **420** is provided between the handle **414** and the cleaning device body **100**, so that the locking mechanism **420** can be conveniently locked and unlocked. For example, the locking assembly **421** is disposed at the cleaning device body **100**, and the locking groove **422** is provided at the handle **414**.

[0196] FIG. **29** is a schematic structural view of a portion D shown in FIG. **25**. In some embodiments, a positioning structure **440** is provided between the filtering box **410** and the inner wall of the accommodating groove **108**. The positioning structure **440** has a positioning function, so that the filtering box **410** can be quickly located at a proper position in the cleaning device body **100** by the locking mechanism **420**, thereby improving efficiency in mounting and removing the filtering box **410**. The positioning structure **440** includes a positioning part (not shown) and a positioning hole **441**. The positioning part is connected to the positioning hole **441** in a positional manner. One of the periphery of the filtering box **410** and the inner side wall of the accommodating groove **108** is provided with the positioning part, and the other is provided with the positioning hole **441**. Positions and quantities of the positioning hole **441** and the positioning part may be determined based on an actual requirement.

[0197] In this embodiment, the periphery of the filtering box **410** is provided with the positioning hole **441**, and the inner side wall of the accommodating groove **108** is provided with the

positioning part. The positioning hole **441** is provided on the filtering box **410**, so that the positioning hole **441** can be conveniently processed. Specifically, the positioning hole **441** is disposed at a side surface of the filtering box **410**, and the side surface is close to the top cover **107**. In addition, the positioning hole **441** is provided close to the locking mechanism **420**, so that the locking mechanism **420** can be conveniently locked. There are two positioning holes **441** disposed at two sides of a side surface of the filtering box **410** respectively, and the side surface faces the top cover **107**. The positioning part may be, but is not limited to, a ball plunger or the like.

[0198] In some embodiments, the cleaning device **1000** further includes an in-position detection mechanism for a filtering box. The in-position detection mechanism for the filtering box is configured to detect whether the filtering box **410** is mounted in position on the cleaning device body **100** to ensure that, only after the filtering box **410** is mounted in position, the cleaning device **1000** can operate normally. This eliminates any user misoperation, prevents ineffective cleaning or a poor cleaning effect, and better improves intelligence of the cleaning device **1000**.

[0199] The in-position detection mechanism for the filtering box may include, but is not limited to, at least one of a sensing assembly (not shown), an inductance assembly (not shown), and a switch assembly (not shown), and a quantity of detection methods can be increased, which may be selected based on an actual requirement. The sensing assembly may be implemented by a Hall element and a Hall magnet mating with each other. The inductance assembly may detect whether the filtering box **410** is in position in an inductive manner. The switch assembly detects, by using a switch part, whether the filtering box **410** is in position. It should be noted that the sensing assembly, the inductance assembly, and the switch assembly may be provided with a waterproof structure based on an actual requirement, to prevent short circuits. This ensures use performance of the in-position detection mechanism for the filtering box and improves stability of the in-position detection mechanism for the filtering box.

[0200] In some embodiments, the in-position detection mechanism for the filtering box includes the sensing assembly. The sensing assembly includes a sensing part (not shown) and a sensing mating part (not shown). When the filtering box **410** is mounted in position, the sensing part and the sensing mating part mate with each other to detect whether the filtering box **410** is mounted in position at the cleaning device body **100**.

[0201] One of the sensing part and the sensing mating part is provided at the filtering box **410**, and the other is provided at the cleaning device body **100**. Specific positions of the sensing part and the sensing mating part may be selected based on an actual situation. Alternatively, each of the sensing part and the sensing mating part is not disposed at the filtering box **410**, but is disposed at other positions. The filtering box **410** may move to drive the sensing part and the sensing mating part to mate with each other to detect whether the filtering box **410** is mounted in position.

[0202] In an embodiment, the sensing part is disposed at the cleaning device body **100**, and the sensing mating part is disposed at the filtering box **410**. The sensing mating part may be detachably or fixedly connected to the filtering box **410**. For example, the filtering box **410** is provided with a filtering box mounting groove, and the sensing mating part is sealed in the filtering box mounting groove. Alternatively, the sensing mating part and the filtering box **410** may be an integral structure, and the sensing mating part is disposed in a side wall of the filtering box **410**. This helps simplify an assembly process. In this embodiment, the sensing part may be a Hall sensing part, and the sensing mating part is the Hall magnet.

[0203] In the sensing assembly, the Hall magnet is used to affect an internal magnetic field to conduct a circuit, so that whether the circuit is open or closed can be detected. When the filtering box **410** is mounted at the cleaning device body **100**, the Hall magnet gradually approaches the Hall sensing part, and magnetic field strength at the Hall sensing part is increased, so that the Hall sensing part is in a triggered state. When the filtering box **410** is removed from the cleaning device body **100**, the Hall magnet gradually moves away from the Hall sensing part, and the magnetic field strength at the Hall sensing part is decreased, so that the Hall sensing part cannot be triggered.

The magnetic field can penetrate the filtering box **410** and the cleaning device body **100**, so that the Hall sensing part can sense the Hall magnet can sense each other.

[0204] In another embodiment, each of the sensing part and the sensing mating part is not disposed at the filtering box **410**, but is disposed at other positions. Specifically, the cleaning device **1000** includes a sealed cavity. The sealed cavity may be a drive box **130**. The filtering box **410** may be detachably mounted in the accommodating groove **108**. The in-position detection mechanism for the filtering box is configured to detect whether the filtering box **410** is mounted in position at the accommodating groove **108**.

[0205] The in-position detection mechanism for the filtering box includes a sensing drive assembly. The sensing drive assembly is connected in the accommodating groove **108**. The sensing part is provided at one of the sensing drive assembly and the sealed cavity, and the sensing mating part is provided at the other of the sensing drive assembly and the sealed cavity. The filtering box **410** acts on the sensing drive assembly, so that the sensing part and the sensing mating part can mate with each other. In a process of mounting the filtering box **410** at the accommodating groove **108**, the filtering box **410** acts on the sensing drive assembly, and the sensing drive assembly moves, so that the sensing part and the sensing mating part mate with each other to implement detection. In a process of removing the filtering box **410** from the accommodating groove **108**, the sensing drive assembly is reset, so that the sensing part cannot sense the sensing mating part. The sensing drive assembly is disposed between the accommodating groove **108** and the sealed cavity.

[0206] As shown in FIG. **30***a* and FIG. **31**, in some embodiments, the filtering box **410** includes a filtering box portion **411** and a rotating portion **412**. The filtering box portion **411** and/or the rotating portion **412** are/is provided with a filtering box outlet (not shown). The filtering box outlet may be a filtering layer portion of the filtering box **410**, and the water entering the filtering box **410** through the debris inlet **413** is directly drained from the filtering box **410** through the filtering layer. The rotating portion **412** may be rotatably provided at the filtering box portion **411**. Compared with the filtering box portion **411**, the rotating portion **412** has an open position and a closed position. When the rotating portion **412** is at the open position, the debris inside the filtering box **410** may be poured out through a debris dumping opening formed by opening the rotating portion **412**. When the rotating portion **412** is at the closed position, the filtering box portion **411** and the rotating portion **412** are enclosed to form the filtering box **410**. The rotating portion **412** and the filtering box portion **411** may be closed and opened, that is, locked and unlocked, through a clamping structure or the like. The debris dumping opening may be disposed opposite to the debris inlet **413**. After the filtering box **410** is removed from the accommodating groove **108**, and the rotating portion **412** is unlocked relative to the filtering box portion **411**, the user holds the handle **414**, and the rotating portion **412** may rotate and be opened under the gravity of the rotating portion **412** to form the debris dumping opening, so that the debris in the filtering box **410** is drained from the debris dumping opening. A periphery of the filtering box of the existing pool robot is closed, so it is inconvenient to scrub by using a water gun. In addition, the filtering box needs to be flipped over to dump the debris, resulting in defects such as dirtying hands and clothes during a dumping process.

[0207] In an embodiment, the filtering box **410** includes at least a first sub side wall (not shown), a second sub side wall (not shown), a third sub side wall (not shown), and a fourth sub side wall (not shown). The first sub side wall and the fourth sub side wall are disposed opposite to each other. The second sub side wall and the third sub are disposed opposite to each other. The first sub side wall is close to the first side portion **1011**. The second sub side wall is close to the second side portion **1012**. The third sub side wall is close to the third side portion **1013**. The fourth sub side wall is close to the fourth side portion **1014**. When the debris inlet **413** is disposed at the first sub side wall, the debris dumping opening may be disposed at any one of the second sub side wall, the third sub side wall, and the fourth sub side wall.

[0208] For the rotating portion **412**, a position of the debris dumping opening may be related to a position of the accommodating opening **102**. For example, when the accommodating opening **102**

and the debris inlet **413** are close to the first side portion **1011**, the rotating portion **412** may include at least the fourth sub side wall, and the debris dumping opening is disposed opposite to the accommodating opening **102**. When the accommodating opening **102** is disposed at the second side portion **1012**, the rotating portion **412** may include at least the third sub side wall. In other embodiments, the position of the debris dumping opening may not be related to the position of the accommodating opening **102**. For example, when the accommodating opening **102** and the debris inlet **413** are close to the first side portion **1011**, the rotating portion **412** may further include at least a part of the second sub side wall or at least a part of the third sub side wall. When the filtering box **410** needs to be cleaned, the rotating portion **412** needs to be manually opened, and the debris dumping opening directly faces downward.

[0209] In an embodiment, the rotating portion **412** is rotatably connected to the filtering box portion **411** through a rotating structure (not shown), so that the rotating portion **412** can rotate relative to the filtering box portion **411**. The rotating structure may include a first rotating shaft **415** and a rotating groove (not shown). The first rotating shaft **415** rotates in the rotating groove, so that the rotating portion **412** can rotate more smoothly relative to the filtering box portion **411**. The first rotating shaft **415** is provided at one of the rotating portion **412** and the filtering box portion **411**, and the rotating groove is provided at the other one of the rotating portion **412** and the filtering box portion **411**. The rotating portion **412** is provided with several first rotating shafts **415**, and the filtering box portion **411** is provided with several rotating grooves. Alternatively, the rotating portion **412** is provided with several rotating grooves, and the filtering box portion **411** is provided with several first rotating shafts **415**.

[0210] In an embodiment, a clamping structure **460** is provided between the rotating portion **412** and the filtering box portion **411**, so that the rotating portion **412** can be releasably clamped to the filtering box portion **411**. The rotating portion **412** can be clamped to the filtering box portion **411** through the clamping structure **460**. When the filtering box **410** is removed from the accommodating groove **108**, and the debris in the filtering box **410** needs to be dumped, the clamping structure **460** is unlocked, the rotating portion **412** is not clamped to the filtering box portion **411**, and the debris is poured out along a direction of the debris dumping opening. Before the filtering box **410** is mounted in the accommodating groove **108**, the rotating portion **412** is clamped to the filtering box portion **411** through the clamping structure **460** to form an integrated filtering box **410**, so that the filtering box **410** can be conveniently mounted in the accommodating groove **108**.

[0211] The clamping structure **460** may include a clamping groove **461** and a clamping block **462**, and the clamping groove **461** is clamped to the clamping block **462**. One of the rotating portion **412** and the filtering box portion **411** is provided with the clamping groove **461**, and the other is provided with the clamping block **462**. In this embodiment, the rotating portion **412** is provided with the rotating block (not shown), and the clamping groove **461** is provided on the rotating block (not shown). The clamping block **462** is disposed at the outer side portion of the filtering box portion **411**. When the rotating portion **412** is provided over the filtering box outlet, the rotating block at least partially covers the outside of the filtering box portion **411**, and the clamping groove **461** is clamped to the clamping block **462**. Alternatively, the clamping block **462** is disposed at the rotating portion **412**, and the clamping groove **461** is disposed at the filtering box **410**.

[0212] In an embodiment, clamping of the clamping structure **460** may be released by an operating mechanism provided at the handle **414**, such as pressing an unlocking structure (not shown). After removing the filtering box **410** from the cleaning device body **100** by using the handle **414**, the user presses the unlocking structure, so that the rotating portion **412** can be opened to form the debris dumping opening, which is convenient for the user to operate.

[0213] As further shown in FIG. **25**, in some embodiments, the main cleaning mechanism **400** or the cleaning device body **100** includes an anti-regurgitation assembly **470**. For example, the anti-regurgitation assembly **470** is provided at the main cleaning mechanism **400**, and the anti-

regurgitation assembly **470** is disposed near the debris inlet **413** of the filtering box **410**. When the cleaning device **1000** moves backward, makes a turn, and stops operating, the anti-regurgitation assembly **470** is configured to prevent at least a part of the debris from being regurgitated to the to-be-cleaned region through the debris inlet **413**, to resolve the problem of the cleaning device **1000** that the debris may be regurgitated. In some embodiments, the anti-regurgitation assembly **470** includes an anti-regurgitation door **471** and an anti-regurgitation drive assembly (not shown). The anti-regurgitation door **471** may be rotatably provided at a position at which the filtering box **410** is close to the debris inlet **413**. The anti-regurgitation drive assembly drives the anti-regurgitation door **471** to rotate relative to the debris inlet **413**. When the cleaning device **1000** moves backward, makes a turn, and stops operating, the anti-regurgitation drive assembly drives the anti-regurgitation door **471** to rotate to block at least a part of the debris inlet **413**, so that the debris in the filtering box **410** is less likely to be regurgitated. The anti-regurgitation door **471** cooperates with the anti-regurgitation drive assembly, so that at least a part of the debris can be actively prevented from being regurgitated to the to-be-cleaned region.

[0214] FIG. **44***a* is a fourth schematic structural view of the filtering box of the cleaning device according to the present disclosure. FIG. **44***b* is a fifth schematic structural view of the filtering box of the cleaning device according to the present disclosure. The anti-regurgitation drive assembly includes an anti-regurgitation drive motor. In other words, a drive shaft of the anti-regurgitation drive motor is connected to the anti-regurgitation door **471** to directly drive the anti-regurgitation door **471** to rotate relative to the debris inlet **413**. Alternatively, the anti-regurgitation drive assembly includes an anti-regurgitation drive motor and an anti-regurgitation gear assembly **4711**. The anti-regurgitation gear assembly **4711** is provided between the anti-regurgitation drive motor and the anti-regurgitation door **471** in a transmission manner. The anti-regurgitation gear assembly **4711** includes at least one gear. The anti-regurgitation drive motor is configured to drive the anti-regurgitation gear assembly **4711** to rotate, and the anti-regurgitation gear assembly **4711** is configured to drive the anti-regurgitation door **471** to rotate relative to the debris inlet **413**. Alternatively, the anti-regurgitation drive assembly includes the anti-regurgitation drive motor and an anti-regurgitation magnetic attraction assembly (not shown). The anti-regurgitation magnetic attraction assembly is provided between the anti-regurgitation drive motor and the anti-regurgitation door **471**. The anti-regurgitation drive motor is configured to drive the anti-regurgitation magnetic attraction assembly to move, and the anti-regurgitation magnetic attraction assembly is configured to drive the anti-regurgitation door **471** in a magnetic transmission manner. In some embodiments, the anti-regurgitation drive assembly includes a first anti-jamming structure **475**, so that the anti-regurgitation gear assembly **4711** can operate stably during transmission, and the following case can be avoided: The anti-regurgitation gear assembly **4711** is jammed because the gear wears, a foreign object wraps around the gear, or the gear is deformed. The first anti-jamming structure **475** may be, but is not limited to, a baffle provided partially or entirely around the anti-regurgitation gear assembly **4711**, a housing covering the anti-regurgitation gear assembly **4711**, a groove in which the anti-regurgitation gear assembly **4711** is disposed, a rail for guiding movement of the foreign object, or the like. The first anti-jamming structure **475** may be disposed on the filtering box **410**, in the accommodating groove **108** (for example, on an inner side portion of the accommodating groove **108**), or partially disposed on the filtering box **410** and partially disposed in the accommodating groove **108**.

[0215] In a specific embodiment, the first anti-jamming structure **475** is partially disposed on the filtering box **410** and partially disposed on the inner side portion of the accommodating groove **108**. FIG. **45***a* is a schematic structural view of the filtering box of the cleaning device according to an embodiment of the present disclosure. FIG. **45***b* is a schematic structural view of the filtering box of the cleaning device according to an embodiment of the present disclosure. FIG. **45***c* is a partial cross-sectional view of the cleaning device according to an embodiment of the present disclosure. As shown in FIG. **45***a* to FIG. **45***c*, the first anti-jamming structure **475** includes a first

anti-jamming sub-structure **4751** and a second anti-jamming sub-structure **4752**. The first anti-jamming sub-structure **4751** is disposed on the filtering box **410**, and the second anti-jamming sub-structure **4752** is disposed on the inner side portion of the accommodating groove **108**. When the filtering box **410** is assembled to the accommodating groove **108**, the first anti-jamming sub-structure **4751** and the second anti-jamming sub-structure **4752** jointly form the first anti-jamming structure **475**, for example, a structure that partially or entirely surrounds the anti-regurgitation gear assembly **4711**, to reduce a possibility that a foreign object enters the anti-regurgitation gear assembly **4711**.

[0216] In some embodiments, the anti-regurgitation door **471** is rotatably connected to the filtering box **410** through a rotating structure, so that the anti-regurgitation door **471** can rotate relative to the debris inlet **413**. FIG. **46** is a schematic structural view of the anti-regurgitation door according to an embodiment of the present disclosure. As shown in FIG. **46**, the rotating structure may include a second rotating shaft **4712**. At least one end of the second rotating shaft **4712** is connected to the anti-regurgitation drive assembly to implement drive control of the anti-regurgitation door **471**. In a specific embodiment, one end of the second rotating shaft **4712** is connected to the anti-regurgitation drive assembly, and the end is provided with a first reinforcing part **4713**, to reduce a risk that the second rotating shaft **4712** is broken under a force. This ensures that the debris in the filtering box **410** is less likely to be regurgitated when the anti-regurgitation door **471** is closed. The first reinforcing part **4713** may be any component having a reinforcing function, such as a reinforcing rib. The first reinforcing part **4713** may be integrally formed with the anti-regurgitation door **471** or connected to the anti-regurgitation door **471** through welding, a threaded connection, or the like.

[0217] In some embodiments, the roller brush **450** includes a roller brush drive assembly. The roller brush drive assembly includes a roller brush drive motor, that is, a drive shaft of the roller brush drive motor is connected to the roller brush **450** to directly drive the roller brush **450** to rotate relative to the debris inlet **413**. Alternatively, the roller brush drive assembly includes a roller brush drive motor and a roller brush gear assembly **4503**. The roller brush gear assembly **4503** is disposed between the roller brush drive motor and the roller brush **450** in a transmission manner. The roller brush gear assembly **4503** includes at least one gear. The roller brush drive motor drives the roller brush gear assembly **4503** to rotate, and the roller brush gear assembly **4503** drives the roller brush **450** to rotate relative to the debris inlet **413**. In some embodiments, the roller brush drive assembly includes a second anti-jamming structure **476**, so that the roller brush gear assembly **4503** can operate stably during transmission, and the following case can be avoided: The roller brush gear assembly **4503** is jammed because the gear wears, a foreign object wraps around the gear, or the gear is deformed. The second anti-jamming structure **476** may be, but is not limited to, a baffle provided partially or entirely around the roller brush gear assembly **4503**, a housing covering the roller brush gear assembly **4503**, a groove in which the roller brush gear assembly **4503** is disposed, a rail for guiding movement of the foreign object, or the like. The second anti-jamming structure **476** may be disposed on the filtering box **410**, in the accommodating groove **108** (for example, on an inner side portion of the accommodating groove **108**), or partially disposed on the filtering box **410** and partially disposed in the accommodating groove **108**.

[0218] In a specific embodiment, the second anti-jamming structure **476** is partially disposed on the filtering box **410** and partially disposed on the inner side portion of the accommodating groove **108**. FIG. **47***a* is a schematic structural view of the filtering box of the cleaning device according to an embodiment of the present disclosure. FIG. **47***b* is a schematic structural view of the filtering box of the cleaning device according to an embodiment of the present disclosure. FIG. **47***c* is a partial cross-sectional view of the cleaning device according to an embodiment of the present disclosure. As shown in FIG. **47***a* to FIG. **47***c*, the second anti-jamming structure **476** includes a third anti-jamming sub-structure **4761** and a fourth anti-jamming sub-structure **4762**. The third anti-jamming sub-structure **4761** is disposed on the filtering box **410**, and the fourth anti-jamming

sub-structure **4762** is disposed on the inner side portion of the accommodating groove **108**. When the filtering box **410** is assembled to the accommodating groove **108**, the third anti-jamming sub-structure **4761** and the fourth anti-jamming sub-structure **4762** jointly form the second anti-jamming structure **476**, for example, a structure that partially or entirely surrounds the roller brush gear assembly **4503**, to reduce a possibility that a foreign object enters the roller brush gear assembly **4503**.

[0219] In some embodiments, when the filtering box **410** is assembled to the accommodating groove **108**, at least two of the first anti-jamming structure **475**, the second anti-jamming structure **476**, and the inner side portion of the accommodating groove **108** are on a same side of the cleaning device **1000** and may jointly form a surrounded region. When the anti-regurgitation gear assembly **4711** and the roller brush gear assembly **4503** are located on a same side of the filtering box **410**, both may be disposed in a surrounded region on the same side. When the anti-regurgitation gear assembly **4711** and the roller brush gear assembly **4503** are located on different sides of the filtering box **410**, the two may be respectively disposed in surrounded regions on corresponding sides. Structures of the surrounded regions on different sides may be the same or may be differently configured based on an actual requirement.

[0220] In a specific embodiment, the accommodating groove **108** further includes a third anti-jamming structure **477**. The third anti-jamming structure **477** may be disposed at a position on the inner side portion of the accommodating groove **108**, and the position is close to the rear portion of the cleaning device **1000**, or may be disposed on a side of a rear portion of the filtering box **410**, to reduce a possibility that a foreign object enters the anti-regurgitation gear assembly **4711** or the roller brush gear assembly **4503** from the rear portion of the cleaning device **1000** when the filtering box **410** is assembled to the accommodating groove **108**. The third anti-jamming structure **477** may be, but is not limited to, a combination of one or more of a baffle, a housing, a groove, or a rail. The third anti-jamming structure **477** may form a surrounded region with at least one of the first anti-jamming structure **475**, the second anti-jamming structure **476**, and other parts of the inner side portion of the accommodating groove **108** (for example, a protrusion on the inner side portion), to further improve an anti-jamming effect for the anti-regurgitation gear assembly **4711** or the roller brush gear assembly **4503**.

[0221] In some embodiments, the roller brush drive assembly and the anti-regurgitation drive assembly are disposed on different sides of the cleaning device body **100**.

[0222] FIG. **32** is a simplified schematic structural view of an anti-regurgitation assembly according to an embodiment of the present disclosure. The anti-regurgitation assembly **470** includes a first anti-regurgitation portion **472**. The first anti-regurgitation portion **472** is provided near the debris inlet **413**. The first anti-spitting part **472** is in a horn-like shape and has a smaller cross-sectional area at a position away from the debris inlet **413**. In other words, the cross-sectional area of the first anti-spitting part **472** gradually decreases in a direction substantially perpendicular to a direction from the first sub side wall (not shown) to the fourth sub side wall (not shown), or in a direction from the debris inlet **413** to the interior of the filtering box **410**. The first anti-regurgitation portion **472** has a large cross-sectional area close to the debris inlet **413** and a small cross-sectional area away from the debris inlet **413**. In this way, the debris can be easy to enter the filtering box **410** and difficult to overflow from the filtering box **410** through the debris inlet **413**. When the cleaning device **1000** moves backward, makes a turn, and stops operating, the first anti-regurgitation portion **472** can prevent at least a part of the debris from being regurgitated to the to-be-cleaned region.

[0223] FIG. **33** is a simplified schematic structural view of the anti-regurgitation assembly according to another embodiment of the present disclosure. The anti-regurgitation assembly **470** includes an anti-regurgitation plate **473**. Two ends of the anti-regurgitation plate **473** are rotatably connected in the filtering box **410** and disposed at the debris inlet **413**. When the cleaning device **1000** moves forward, the agitated water flow makes the anti-regurgitation plate **473** rotate toward

inner space of the filtering box **410**, so that the debris inlet **413** is opened, and the debris easily enters the filtering box **410**. When the cleaning device **1000** moves backward, makes a turn, and stops operating, the agitated water flow disappears or weakens. In this case, under the action of a configuration of the anti-regurgitation plate **473** and an action force, the debris inlet **413** is closed by the anti-regurgitation plate **473** to prevent at least a part of the debris from being regurgitated to the to-be-cleaned region. A buoyancy structure (not shown) or the like may be provided in the anti-regurgitation plate **473**, so that the anti-regurgitation plate **473** can at least block the debris inlet **413** by using the buoyancy structure when there is no agitated water flow. Alternatively, a position of the anti-regurgitation plate **473** is adjusted, so that the anti-regurgitation plate **473** closes the debris inlet **413** under the gravity of the anti-regurgitation plate **473**. It should be noted that the anti-regurgitation plate **473** is always disposed inside the filtering box **410**.

[0224] FIG. **34** is a simplified schematic structural view of the anti-regurgitation assembly according to yet another embodiment of the present disclosure. Several second anti-regurgitation portions **474** are provided at the debris inlet **413** of the filtering box **410** and extend into the filtering box **410**. The several second anti-regurgitation portions **474** are disposed on an inner wall close to the debris inlet **413** in a staggered manner to form a serrated anti-regurgitation structure. In addition, the several second anti-regurgitation portions **474** extend toward the interior of the filtering box **410**. The staggered second anti-regurgitation portions **474** may be at least disposed on a transition channel extending from the debris inlet **413** to the interior of the filtering box **410**, such as an inner side of an upper wall and an inner side of a lower wall, an inner side of each of two opposite side walls, or an inner side of each of four inner walls, of the transition channel. The second anti-regurgitation portion **474** extends along a direction from the first sub side wall to the fourth sub side wall and is configured at an acute angle with the inner side wall of the filtering box **410**, to prevent at least a part of the debris from being regurgitated to the to-be-cleaned region.

[0225] In some embodiments, the cleaning device **1000** includes a roller brush **450**. The roller brush **450** may be rotatably provided at the cleaning device body **100** or the debris inlet of the filtering box **410**. The cleaning device **1000** includes a roller brush drive assembly. The roller brush **450** is driven by the roller brush drive assembly. The roller brush **450** exists alone, or the roller brush **450** and at least one component, two components, or a plurality of components of the anti-regurgitation assembly **470** coexist. For example, the roller brush **450** and the anti-regurgitation door **471** coexist in the cleaning device **1000**, or the roller brush **450** and the first anti-regurgitation portion **472** coexist in the cleaning device **1000**, or the roller brush **450** and the anti-regurgitation plate **473** coexist in the cleaning device **1000**, or the roller brush **450**, the first anti-regurgitation portion **472**, and the anti-regurgitation plate **473** coexist in the cleaning device **1000**. In a specific embodiment, when the roller brush **450** and the anti-regurgitation assembly **470** coexist in the cleaning device **1000**, there is no interference between the roller brush **450** and the anti-regurgitation assembly **470**, that is, there is no interference between a movement track of the roller brush **450** and a movement track of the anti-regurgitation assembly **470**. Alternatively, when there is an interference between the roller brush **450** and the anti-regurgitation assembly **470**, the anti-regurgitation assembly **470** or the roller brush **450** may be made of a flexible material to reduce hard contact between the anti-regurgitation assembly **470** and the roller brush **450**, thereby reducing damage to components. In some cases, the anti-regurgitation plate **473** is the anti-regurgitation door **471**. In another specific embodiment, when the roller brush **450** and the anti-regurgitation assembly **470** coexist in the cleaning device **1000**, there is an interference between the roller brush **450** and the anti-regurgitation assembly **470**, and the anti-regurgitation assembly **470** and the roller brush **450** are both made of a rigid material.

[0226] The roller brush **450** may be made of a rigid material or a flexible material, or the roller brush **450** may be partially made of a rigid material and partially made of a flexible material. In some embodiments, the roller brush includes a roller brush blade **4501** and a roller brush base **4502**. The roller brush blade **4501** is disposed on the roller brush base **4502**. A shape of the roller

brush base **4502** may be, but is not limited to, cylindrical. FIG. **30***b* is a third schematic structural view of the filtering box of the cleaning device according to the present disclosure. FIG. **30***c* is a schematic structural view of the roller brush of the cleaning device according to the present disclosure. The roller brush base **4502** may be made of a rigid material, and the roller brush blade **4501** may be made of a flexible material, or the roller brush blade **4501** may be partially made of a flexible material and partially made of a rigid material (for example, a part of the roller brush blade **4501** is connected to the roller brush base **4502**, the part is made of a rigid material, and other parts of the roller brush blade **4501** are made of a flexible material). When a hard object, such as a branch, is located between the roller brush **450** and other mechanisms of the cleaning device body **100**, the flexible roller brush blade **4501** is deformed, so that a possibility that the hard object is stuck between the roller brush blade **4501** and other mechanisms of the cleaning device body **100** can be reduced. In this way, a possibility that the roller brush **450** stops rotating is reduced, and a possibility that the roller brush **450** is damaged is reduced. In some embodiments, roller brush blades **4501** are discontinuous in an axial direction of the roller brush base **4502**. When the cleaning device **1000** performs water surface cleaning, because each roller brush blade **4501** is in contact with the water surface, contact areas of the roller brush blades **4501** with the water are reduced. In this way, slaps of the roller brush blades **4501** against the water surface are reduced when the roller brush blades **4501** are in contact with the water surface, and resistance applied to the cleaning device **1000** is reduced when the cleaning device **1000** enters the water. In some embodiments, the roller brush blades **4501** are staggered in the axial direction of the roller brush base **4502**, so that during rotation of the roller brush, the roller brush blade **4501** is always in contact with the water surface to form a continuous agitated water flow. This improves efficiency of external debris entering the filtering box **410** and improves an effect of preventing at least a part of the debris inside the filtering box **410** from being regurgitated. In some embodiments, the roller brush blade **4501** is disposed obliquely in the axial direction of the roller brush base **4502** to reduce a contact area of a single roller brush blade **4501** with water. In this way, resistance applied to the cleaning device **1000** is reduced when the cleaning device **1000** enters the water. In some embodiments, a length of the roller brush blade **4501** is increased to increase an amount of water stirred by the roller brush blade **4501**, so that intensity of the water flow formed during rotation of the roller brush blade **4501** is increased. This further improves the efficiency of external debris entering the filtering box **410** and improves the effect of preventing at least a part of the debris inside the filtering box **410** from being regurgitated.

[0227] In some embodiments, the roller brush drive assembly may be a roller brush drive motor. In other words, a drive shaft of the roller brush drive motor is connected to the roller brush **450** to directly drive the roller brush **450** to rotate. Alternatively, the roller brush drive assembly includes the roller brush drive motor and a roller brush transmission assembly (not shown). The roller brush transmission assembly is provided between the roller brush drive motor and the roller brush **450** in a transmission manner. The roller brush drive motor drives the roller brush transmission assembly to rotate, and the roller brush transmission assembly drives the roller brush **450** to rotate. The roller brush transmission assembly may be, but is not limited to, a roller brush gear assembly, a roller brush belt assembly, or the like. Alternatively, the roller brush drive assembly includes the roller brush drive motor and a roller brush magnetic attraction assembly (not shown). The roller brush magnetic attraction assembly is provided between the roller brush drive motor and the roller brush **450**, the roller brush drive motor drives the roller brush magnetic attraction assembly to move, and the roller brush magnetic attraction assembly drives the roller brush **450** in a magnetic transmission manner. Compared with a case where the roller brush **450** is directly driven by the roller brush drive motor or is jointly driven by the roller brush drive motor and the roller brush transmission assembly, in this embodiment, the roller brush magnetic attraction assembly and the roller brush **450** cooperate with each other, so that it is easy to mount the roller brush **450** in position without considering whether gears are engaged with each other in position. When the roller brush **450** is

jammed due to rigid objects such as branches, or the roller brush **450** is stuck because the filtering box **410** is full of the debris, the roller brush magnetic attraction assembly may still rotate relative to the roller brush **450**, so that the roller brush drive motor can still rotate without generating abnormal noise. The roller brush drive motor may be, but is not limited to, a stepper motor.

[0228] In an embodiment, the roller brush drive motor may be the stepper motor. The roller brush magnetic attraction assembly includes a first roller brush magnetic attraction part (not shown) and a second roller brush magnetic attraction part (not shown). The first roller brush magnetic attraction part is connected to a drive shaft of the stepper motor. The second roller brush magnetic attraction component is provided at the filtering box **410** and is connected to the roller brush **450**. When the roller brush drive motor is in operation, the first roller brush magnetic attraction part and the second roller brush magnetic attraction part rotate relative to each other, and the roller brush **450** rotates with the second roller brush magnetic attraction part. When the roller brush **450** is jammed due to rigid objects such as branches, or the roller brush **450** is stuck because the filtering box **410** is full of the debris, the first roller brush magnetic attraction part and the second roller brush magnetic attraction part may still rotate relative to each other, so that the roller brush drive motor can still rotate without generating abnormal noise. It should be noted that a disposition manner and a principle of the roller brush magnetic attraction assembly are the same as a disposition manner and a principle of the anti-regurgitation magnetic attraction assembly. Details are not described herein. A structure of the roller brush drive assembly may be the same as that of the auxiliary drive assembly **550**.

[0229] In some embodiments, the cleaning device **1000** includes a side brush **511** and an auxiliary drive assembly **550**. The auxiliary drive assembly **550** is connected to the side brush **511**, and the auxiliary drive assembly **550** may provide a driving force for the side brush **511**. When there are several side brushes **511**, there are several auxiliary drive assemblies **550** connected to the several side brushes **511** in one-to-one correspondence. Alternatively, when there are several side brushes **511**, there is one auxiliary drive assembly **550**, and the one auxiliary drive assembly **550** drives the several side brushes **511** simultaneously. The auxiliary drive assembly **550** may be the side brush drive motor. Alternatively, the auxiliary drive assembly **550** includes the side brush drive motor and a side brush transmission assembly. The side brush transmission assembly may be, but is not limited to, a side brush gear transmission assembly, a side brush belt transmission assembly, or the like. Alternatively, the auxiliary drive assembly **550** includes the side brush drive motor and a side brush magnetic attraction assembly. It should be noted that the auxiliary drive assembly **550** may be the same as or similar to the roller brush drive assembly. Details are not described herein. The auxiliary drive assembly **550** may be the third drive assembly.

[0230] In some embodiments, the cleaning device **1000** further includes the roller brush **450** and several side brushes **511**. The roller brush **450** is driven by the roller brush drive assembly, and the several side brushes **511** are driven by one or several auxiliary drive assemblies **550**. Alternatively, the roller brush **450** and the several side brushes **511** are simultaneously driven by one drive assembly. In this case, the roller brush **450** and the several side brushes **511** need to be driven by a corresponding roller brush transmission assembly or a corresponding side brush transmission assembly, thereby implementing simultaneous driving.

[0231] In some embodiments, in the cleaning device **1000**, an output end of a drive motor (for example, the roller brush drive motor, the side brush drive motor, or the anti-regurgitation drive motor) may be sealed, for example, by disposing a sealing structure, to avoid the following case: Water enters the motor through a gap at the output end of the motor, causing the motor to short-circuit, rust, or have other malfunctions. This ensures normal operation of the motor. The sealing structure is a structure having a sealing function and may be, but is not limited to, a double-lip oil seal, to ensure reliability and a service life of the drive motor when the drive motor operates in a humid environment or underwater.

[0232] FIG. **35** is a schematic structural view of a side brush drive motor according to the present

disclosure. In some embodiments, each of the roller brush drive motor and the side brush drive motor **552** may be the stepper motor. The cleaning device **1000** includes a real-time rotation speed detection assembly (not shown). The real-time rotation speed detection assembly may be provided at the stepper motor. The real-time rotation speed detection assembly may be configured to detect a rotation speed of the stepper motor in real time, to determine, based on the rotation speed, whether the stepper motor is out of step. When the real-time rotation speed detection assembly detects that the stepper motor is out of step, the real-time rotation speed detection assembly feeds back a signal to a control system (not shown), and the control system increases a current of the stepper motor incrementally, to increase an output torque of the stepper motor. In this way, a requirement that the stepper motor can normally operate under heavy load for the cleaning device **1000** can be met.

[0233] In an embodiment, when the cleaning device **1000** performs water surface cleaning, the load of the cleaning device **1000** is small, and the control system provides a low current to meet the normal operation of the stepper motor. When an external load increases, such as when the side brush **511** cleans the wall or when the side brush **511** or the roller brush **450** is jammed by leaves, branches, and the like, the low current cannot meet a requirement that the stepper motor normally operates at a rated rotation speed. In this case, the real-time rotation speed detection assembly detects that the stepper motor is out of step and feeds back a detection result to the control system, and the control system appropriately increases the current gradually, to meet a requirement that the stepper motor can normally operate under a current load. Currently, the maximum current setting levels may be set to 4096 levels, and a specific setting of levels may be adjusted based on an actual requirement. The stepper motor, the real-time rotation speed detection assembly, and the control system cooperate with each other, to ensure that the side brush **511** and/or the roller brush **450** can efficiently operate for a long time.

[0234] In another embodiment, when the multi-functional cleaning device moves in the water and cleans in a region close to the wall of the pool, the side brush **511** cleans the wall of the pool, and the load is high. The real-time rotation speed detection assembly detects a state of the stepper motor in real time and feeds back the detection result to the control system, and the control system adjusts an input current of the stepper motor to meet the normal operation under the current load.

[0235] The stepper motor has advantages of high reliability, a long service life, precise control, and the like, which meets driving requirements of the side brush **511** and/or the roller brush **450**. Specifically, the stepper motor is featured by reliability. For example, when the cleaning device **1000** performs water surface cleaning, an output rotation speed of the stepper motor is less than or equal to 100 rpm, and the stepper motor may operate directly at 100 rpm without an additional reduction gearbox. Compared with an existing drive motor that rotates at thousands to tens of thousands of rpm and needs to be provided with the reduction gearbox to meet a requirement for a low rotation speed, the stepper motor in embodiments of the present disclosure has a simpler structure, and a risk of a system failure is reduced. In this embodiment, when the cleaning device **1000** performs water surface cleaning, the output rotation speed of the stepper motor may be greater than or equal to 40 rpm and less than or equal to 100 rpm. The output rotation speed of the stepper motor may be, but is not limited to, 40 rpm, 50 rpm, 60 rpm, 70 rpm, 85 rpm, 94 rpm, or 100 rpm. Further, the output rotation speed of the stepper motor may be greater than or equal to 60 rpm and less than or equal to 80 rpm.

[0236] The stepper motor is featured by a long service life. The stepper motor does not include a carbon brush and a commutator, so that mechanical wear and tear of the stepper motor can be reduced, thereby improving the service life of the stepper motor. In addition, maintenance costs can be reduced, and a frequency of replacing a part can be decreased. The stepper motor is featured by precise control. The stepper motor may be configured to convert an electrical pulse signal into angular displacement or linear displacement. In a non-overloaded situation, the rotation speed and a stopping position of the stepper motor only depend on a frequency and a pulse count of the pulse signal, and are not affected by load changes.

[0237] In an embodiment, the real-time rotation speed detection assembly includes a grating disk **561** and a grating sensor **562**. The grating disk **561** is mounted on the drive shaft of the stepper motor. A photoelectric emission part in the grating sensor **562** is mounted at the drive housing **551**, and the photoelectric emission part is at least partially located near two side surfaces of the grating of the grating disk **561**. A receiving part in the grating sensor **562** is connected to the control system. When the stepper motor rotates, the grating disk **561** rotates synchronously. For a person skilled in the art, a detection principle of the grating disk **561** and a detection principle of the grating sensor **562** are conventional technologies. The grating disk **561** and the grating sensor **562** may cooperate with each other to detect whether the stepper motor is out of step. An upper surface of the grating disk **561** is in a planar and annular shape. The drive shaft passes through and is connected to a middle part of the grating disk **561**. A side wall is provided around a periphery of a lower surface of the grating disk **561** and is substantially perpendicular to the upper surface. An equidistant grating is provided at the side wall. The grating sensor **562** is at least partially mounted on the two side surfaces of the grating.
[0238] In other embodiments, the real-time rotation speed detection assembly further includes a Hall code disk (not shown) and a Hall element (not shown). The drive shaft of the stepper motor passes through and is connected to the Hall code disk. The Hall code disk is provided with several Hall magnetic parts (not shown). The Hall element is provided on a drive circuit board (not shown). The drive circuit board is connected to the stepper motor. The drive circuit board does not rotate with the drive shaft of the stepper motor. When the Hall code disk rotates with the drive shaft, each Hall magnetic part approaches the Hall element in turn, and the Hall element is configured to sense magnetic field strength of the Hall magnetic part. The Hall element feeds back a signal of the magnetic field strength to the drive circuit board in real time, to detect in real time whether the stepper motor is out of step.
[0239] In some embodiments, the real-time rotation speed detection assembly may further include a magnetic encoder (not shown). This is not limited herein.
[0240] In some embodiments, a real-time rotation speed detection assembly corresponding to the roller brush drive motor may be different from a real-time rotation speed detection assembly corresponding to the side brush drive motor **552**. For example, the real-time rotation speed detection assembly corresponding to the roller brush drive motor includes the magnetic encoder, and the real-time rotation speed detection assembly corresponding to the side brush drive motor includes the grating disk **561**, the grating sensor **562**, and the like. In an embodiment, because the roller brush **450** is connected to the gear, once the roller brush drive motor is out of step, loud noise may be generated due to vibration of the roller brush **450** and the gear. A component accuracy of the real-time rotation speed detection assembly corresponding to the roller brush drive motor may be improved by using the magnetic encoder with high resolution or the like, to narrow a recognized step-out range of the roller brush drive motor. The step-out range is a range within which the roller brush drive motor may be out of step. The roller brush drive motor is adjusted within a small step-out range to reduce an amplitude of the vibration generated by the roller brush drive motor. In this way, the noise generated due to the vibration of the roller brush **450** can be reduced, thereby improving product experience.
[0241] As further shown in FIG. **1** and FIG. **2**, in some embodiments, the cleaning device **1000** includes the solar mechanism **600**. The solar mechanism **600** includes the solar panel (not shown). The solar panel is provided on a side surface of the top cover **107**, and the side surface is away from the accommodating groove **108**. The solar panel may be electrically connected to a battery pack (not shown) to supply power to an electrical component of the cleaning device **1000** through the battery pack. Alternatively, the solar panel directly supplies power to the electrical component of the cleaning device **1000**.
[0242] A length direction of the filtering box **410** of the main cleaning mechanism **400** extends along the forward direction of the cleaning device body **100**. A width direction of the filtering box

410 extends along a direction substantially perpendicular to the forward direction of the cleaning device body **100**. A length of the filtering box **410** is greater than or equal to a width of the filtering box **410**. In addition, the width of the filtering box **410** is greater than or equal to a height of the filtering box **410**. In other words, the filtering box **410** is laid flat in the accommodating groove **108**. A size of the filtering box **410** is limited, so that an unfolded area of the cleaning device **1000** in the pool can be increased, and a size of the cleaning device **1000** in the height direction can be reduced, thereby improving the cleaning efficiency of the main cleaning mechanism **400**. In addition, the size of the filtering box **410** is limited, so that a surface area of the top cover **107** is large correspondingly, and an area of the solar panel is increased, thereby improving energy supplement efficiency of the cleaning device **1000**.

[0243] In some embodiments, a maximum length of the contour of the cleaning device body **100** along the forward direction is defined as a first length and represented as L, and a maximum width of the contour of the cleaning device body **100** along a direction perpendicular to the forward direction is defined as a first width and represented as W. In addition, a maximum length of the solar panel along the forward direction is defined as a second length and represented as **1**, and a maximum width of the solar panel along the direction perpendicular to the forward direction is defined as a second width and represented as w. In this case, $1>1/L\geq 0.7$, and $1>w/W\geq 0.5$. Based on the disposition of the filtering box **410**, the top cover **107** does not need to be frequently flipped and opened by the user, and the area of the solar panel may be set to be larger, thereby improving the energy supplement efficiency. Herein, I/L, namely, a ratio of 1 to L, may be, but is not limited to, 0.7, 0.73, 0.78, 0.8, 0.84, 0.85, 0.91, 0.98, or the like, and w/W, namely, a ratio of w to W, may be, but is not limited to, 0.5, 0.54, 0.62, 0.69, 0.72, 0.78, 0.9, 0.94, 0.98, or the like.

[0244] In an embodiment, $1>1/L\geq 0.75$, and $1>w/W\geq 0.6$. For example, L is 532 mm, W is 486 mm, 1 is 425 mm, and w is 328 mm. In this case, 1/L is equal to 0.79, and w/W is equal to 0.67. A size of the solar panel is related to the overall contour of the cleaning device body **100**, and the size of the solar panel may be set as required.

[0245] In other embodiments, 1 may represent the maximum length of the solar panel along the forward direction, and w may represent the maximum width of the solar panel along the direction substantially perpendicular to the forward direction, where $1\geq 400$ mm, $w\geq 320$ mm, and $1\geq w$. Based on the disposition of the filtering box **410**, the solar panel may be directly fixed on the cleaning device body **100** or the buoyancy cavity **210**, to increase the size and the area of the solar panel, thereby improving the energy supplement efficiency of the cleaning device **1000**. Herein, 1 may be, but is not limited to, 400 mm, 420 mm, 431 mm, 445 mm, 465 mm, 470 mm, 500 mm, 530 mm, 590 mm, 600 mm, 700 mm, or the like, and w may be, but is not limited to, 320 mm, 370 mm, 431 mm, 470 mm, 500 mm, 530 mm, 590 mm, 600 mm, or the like.

[0246] In an embodiment, when the filtering box **410** is assembled in the cleaning device **1000**, a projection range of the solar panel is equal to or greater than a projection range of the filtering box **410** along a height direction, namely, the height direction of the cleaning device **1000**. In other words, a projection area of the solar panel is equal to or greater than a projection area of the filtering box **410** along the height direction of the cleaning device **1000**. Further, when the solar panel is located above the filtering box **410**, a projection of the solar panel partially or completely overlaps with a projection of the filtering box **410**, and the projection range of the solar panel is equal to or greater than the projection range of the filtering box **410**. Because the filtering box **410** occupies large space in the cleaning device **1000**, a size of the solar panel is large, thereby improving energy supplement efficiency of the cleaning device **1000**.

[0247] FIG. **36***a* is a first side view of the cleaning device according to the first embodiment of the present disclosure. FIG. **36***b* is a second side view of the cleaning device according to the first embodiment of the present disclosure. FIG. **37** is a schematic structural view of the cleaning device according to the first embodiment of the present disclosure. In some embodiments, the cleaning device body **100** is provided with a wireless charging interface **120**. The cleaning device **1000** may

be charged and powered through the wireless charging interface **120**, to meet a requirement for cleaning the pool on a rainy day. The wireless charging interface **120** may be disposed at the top cover **107** or the outer side portion of the cleaning device body **100**, such as one of the first side portion **1011**, the second side portion **1012**, the third side portion **1013**, and the fourth side portion **1014**. There may be one, two, or a plurality of wireless charging interfaces **120**. In this embodiment, there is one wireless charging interface **120**, and the wireless charging interface **120** is disposed at the fourth side portion **1014**.

[0248] The wall of the pool or the edge of the pool is provided with a wireless charging connector **2000** and an adapter **2001**. One end of the adapter **2001** is connected to a power source through a cable, and the other end of the adapter **2001** is connected to the wireless charging connector **2000** through a cable. The wireless charging connector **2000** is electrically connected to the wireless charging interface **120** to implement wireless charging.

[0249] In some embodiments, FIG. **48** is a schematic structural view of the wireless charging interface and the wireless charging connector according to an embodiment of the present disclosure. As shown in FIG. **48**, an end (denoted as a connection end) of the adapter **2001** is connected to the wireless charging connector **2000**, and the end is provided with a second reinforcing part **2002** configured to improve strength of the connection end and reduce a risk that the connection end is broken due to an external force. In addition, the second reinforcing part **2002** may serve as a force bearing point for a user to take the wireless charging connector **2000**. Specifically, the second reinforcing part **2002** may partially or entirely surround the connection end. When the user pulls a cable between the adapter **2001** and the wireless charging connector **2000** or removes the connection end, leading to an external force applied to the connection end, a possibility that the connection end is broken due to the external force can be effectively reduced by using the second reinforcing part **2002**. This ensures a secure and reliable connection between the adapter **2001** and the wireless charging connector **2000**. The second reinforcing part **2002** may be any component having a reinforcing function, for example, multi-layer buckles or a reinforcing rib.

[0250] In some embodiments, an automatic alignment assembly (not shown) is provided between the wireless charging interface **120** and the wireless charging connector **2000**. Accuracy of automatic charging alignment of the wireless charging interface **120** and the wireless charging connector **2000** can be improved through the automatic alignment assembly. The automatic alignment assembly may be a magnetic attraction structure, an inserting structure, a clamping structure, or the like.

[0251] In an embodiment, the automatic alignment assembly includes a magnetic attraction automatic alignment assembly (not shown). The magnetic attraction automatic alignment assembly includes a first charging magnetic attraction part and a second charging magnetic attraction part. The first charging magnetic attraction part is provided at the wireless charging interface **120**, and the second charging magnetic attraction part is provided at the wireless charging connector **2000**. The first charging magnetic attraction part is connected to the second charging magnetic attraction part in a magnetic attraction manner, so that the wireless charging interface **120** and the wireless charging connector **2000** can automatically align for performing charging. In this way, the user does not need to manually plug the wireless charging connector **2000** in the wireless charging interface **120** precisely, thereby improving accuracy of automatic charging of the wireless charging interface **120** and the wireless charging connector **2000**, and improving usage experience. In addition, charging stability can also be improved. The first charging magnet may be, but is not limited to, a first charging magnet. The second charging magnet may be, but is not limited to, a second charging magnet.

[0252] In some embodiments, the cleaning device **1000** includes a water quality detection assembly. The water quality detection assembly is provided at the cleaning device body **100**. When the cleaning device **1000** enters the pool, a probe portion of the water quality detection assembly is at least located in the pool and is configured to detect and obtain water quality data of the to-be-

cleaned region. The water quality detection assembly may detect, but is not limited to, at least one water quality parameter of a pH value, an ORP value, an EC value, a TDS value, and a water temperature. The water quality detection assembly may be detachably connected to the cleaning device body **100**. This facilitates mounting and replacement of the water quality detection assembly.

[0253] In some embodiments, the cleaning device **1000** includes a processor **3002**. The water quality detection assembly is connected to the processor **3002**. The water quality detection assembly feeds back the detected water quality data to the processor **3002**. The processor **3002** transmits the detected water quality data to an APP on a mobile phone through wireless communication. The user may check the water quality parameter of the pool in real time by using the APP, such as the PH, the ORP, the EC, the TDS, and the water temperature. The APP may further provide the user with a water quality treatment suggestion based on the water quality parameter of the pool, such as a reagent type and a quantity of reagents.

[0254] In some embodiments, the cleaning device **1000** further includes an in-position detection mechanism for the water quality detection assembly (not shown). The in-position detection mechanism for the water quality detection assembly may be configured to detect whether the water quality detection assembly is mounted in position on the cleaning device body **100** to ensure that the cleaning device **1000** may operate normally only after the water quality detection assembly is mounted in position. This reduces a problem of ineffective detection or a poor detection effect of the water quality detection assembly, thereby better improving intelligence of the cleaning device **1000**. For a specific detection manner of the in-position detection mechanism for the water quality detection assembly, refer to the in-position detection mechanism for the filtering box. Details are not described herein again.

[0255] In some embodiments, the cleaning device **1000** includes a water quality treatment assembly **810** and a drive box **130**. The water quality treatment assembly **810** may be detachably mounted on the cleaning device body **100**. For example, the water quality treatment assembly **810** is provided at the rear portion of the cleaning device body **100**. The water quality treatment assembly **810** may be separately detached, or the water quality treatment assembly **810** is integrated with a detachable apparatus (for example, the filtering box **410**) of the cleaning device body **100** and detached with the detachable apparatus. The water quality treatment assembly **810** spreads a reagent into the pool to implement water quality treatment of the pool. The water quality treatment assembly **810** includes a reagent kit **811** and a reagent drive part (not shown). The reagent kit **811** is configured to store one or more reagents. The reagent may include, but is not limited to, a disinfectant, an algaecide, a coagulant aid, a pH adjuster, and the like. The reagent in the reagent kit **811** may be automatically spread under an external condition (for example, after being in contact with water, the reagent gradually dissolves, or the reagent is gradually released under gravity) or may be actively spread by using the reagent drive part of the cleaning device **100**. The drive box **130** is provided in the cleaning device body **100**, or the reagent kit **811** includes the reagent drive part, or the drive box **130** includes the reagent drive part. The reagent drive part is configured to provide a driving force to spread the reagent. The reagent drive part may be a reagent drive pump.

[0256] The water quality treatment assembly **810** further includes a first reagent pipeline (not shown) and a second reagent pipeline (not shown). The first reagent pipeline and the second reagent pipeline may be provided in the drive box **130**. One end of the first reagent pipeline communicates with an outlet of the reagent kit **811** in a sealing manner, and the other end of the first reagent pipeline communicates with an inlet of the reagent drive part. One end of the second reagent pipeline communicates with an outlet of the reagent drive part, and the other end of the second reagent pipeline extends from the drive box **130** in a sealing manner and communicates with a reagent outlet. The first reagent pipeline, the second reagent pipeline, and the reagent drive part cooperate with each other, so that the reagent in the reagent kit **811** can be spread into the pool

under the action of the reagent drive part. In some embodiments, the reagent outlet is provided on a housing of the drive box **130**. In some embodiments, a filtering mesh is provided at the reagent outlet to prevent external debris from entering the drive box and causing damage to the drive box. The housing of the cleaning device **1000** is further provided with a reagent spread opening. For example, a bottom housing of the cleaning device **1000** is provided with the reagent spread opening. The drive box **130** may be disposed on the bottom housing of the cleaning device **1000**. The bottom of the drive box **130** is provided with the reagent outlet. The reagent outlet cooperates with the reagent spread opening on the bottom housing, so that the reagent is driven by the reagent drive part to flow from the reagent kit **811** to the pool through the first reagent pipeline, the reagent drive part, the second reagent pipeline, the reagent outlet, and the reagent spread opening sequentially.

[0257] The water quality detection assembly may be configured to detect water quality data of the pool and transmit the water quality data to the processor **3002** of the cleaning device **1000**. The processor **3002** may determine one or more abnormal water quality parameters based on the water quality data, and determine a reagent type for water treatment, a quantity of reagents, a reagent drainage manner, and the like based on the abnormal water quality parameters. If it is detected that the water quality is abnormal, and the water needs to be treated, the cleaning device **1000** may control the reagent drive part to be opened. The reagent in the reagent kit **811** may be released into the water of the pool through the reagent drive part to treat the water quality of the pool. The reagent drainage manner may include a continuous drive drainage manner or an intermittent drive drainage manner.

[0258] In some embodiments, the reagent kit **811** may be detachably connected to the cleaning device body **100**, so that the reagent kit **811** can be mounted and replaced, thereby facilitating storage of different reagents. The drive box **130** may be a sealed cavity and fixedly provided at the cleaning device body **100**. The drive box **130** may accommodate, but is not limited to, a battery pack, the reagent drive pump, a circuit board, and the like. This can reduce costs.

[0259] In some embodiments, when the cleaning device **1000** performs underwater cleaning, at least a part of the battery pack is located below the water surface, so that heat of the battery pack can be transferred to the water body, thereby cooling the battery pack. In this way, the following case can be avoided: charging efficiency is affected by high temperature of the battery pack duc to direct sunlight and other factors, and working efficiency of the cleaning device **1000** is affected. In an embodiment, to reduce damage to the battery pack caused by water ingress into the battery pack, a housing may be provided outside the battery pack, and a thermally conductive sheet may be provided between the housing and the battery pack, so that a part of the battery pack, where the part is located below the water surface, is not directly in contact with the water body. It may be understood that, if the battery pack is originally disposed in a certain housing, such as a housing of the drive box **130**, the thermally conductive sheet may be provided between the housing and the battery pack.

[0260] In some embodiments, the cleaning device **1000** further includes an in-position detection mechanism for the reagent kit (not shown). The in-position detection mechanism for the reagent kit includes at least one of a sensing assembly, an inductance assembly, and a switch assembly. For example, the sensing assembly and the inductance assembly may be a Hall sensing part and a Hall magnet respectively provided at the reagent kit and the cleaning device body **100**. For a specific detection manner of the in-position detection mechanism for the reagent kit, refer to the in-position detection mechanism for the filtering box. Details are not described herein again.

[0261] In some embodiments, when the filtering box **410** is assembled to the accommodating groove **108**, the filtering box **410** forms a water discharge channel with the rear portion of the cleaning device body **100**. At least a part of water discharged from the filtering box **410** may be discharged through the water discharge channel along the forward direction of the cleaning device **1000**. The water discharge channel may be a virtual channel or a physical channel and configured

for the filtering box **410** to be in fluid communication with the rear portion of the cleaning device body **100**. In other words, at least a part of water discharged from the filtering box **410** can be directly discharged from the rear portion of the cleaning device body **100** without being obstructed by other components (for example, the water quality treatment assembly **810** and/or the drive box **130**) on the rear portion of the cleaning device body **100**. Therefore, a possibility that water flows out from positions (for example, the second side portion **1012** or the third side portion **1013**) on the cleaning device body **100** other than the rear portion is reduced. This prevents water flowing out from other positions from pushing uncleaned debris away from the cleaning device body **100**.

[0262] In a specific embodiment, in the forward direction of the cleaning device **1000**, the rear portion of the cleaning device body **100** includes the rear portion of the filtering box **410**. Specifically, when the filtering box **410** is assembled to the cleaning device body **100**, the rear portion of the filtering box **410** may serve as a part of the rear portion of the cleaning device body **100**.

[0263] In some embodiments, FIG. **49***a* is a partial structural view of the cleaning device according to an embodiment of the present disclosure, and FIG. **49***b* is a partial structural view of the cleaning device according to an embodiment of the present disclosure. As shown in FIG. **49***a* and FIG. **49***b*, along the forward direction of the cleaning device **1000**, at least one propeller **310** is disposed behind the filtering box **410** or at the rear portion of the filtering box **410**. When the propeller **310** is disposed behind the filtering box **410**, a projection range of the propeller **310** at least partially overlaps with a projection range of the filtering box **410** along the forward direction of the cleaning device **1000**, and the filtering box **410** is in front of the propeller **310**. When the propeller **310** is disposed at the rear portion of the filtering box **410**, the projection range of the propeller **310** at least partially overlaps with a projection range of the rear portion of the filtering box **410** along the direction perpendicular to the forward direction of the cleaning device **1000**. The rear portion of the filtering box **410** is at least the last third portion of the filtering box **410** along the forward direction of the cleaning device **1000** after the filtering box **410** is assembled to the cleaning device body **100**.

[0264] The propeller **310** is adjacent to the filtering box **410**, and there are no other components between the propeller **310** and the filtering box **410**. Water discharged from the filtering box **410** may flow directly through the propeller **310**. The propeller **310** may exert a certain suction effect on the water flowing through the filtering box **410**, so that a suction effect of the filtering box **410** for debris is improved. In a specific embodiment, a water outlet of the propeller **310** is provided on the rear portion of the cleaning device body **100**. Because there are no other components between the propeller **310** and the filtering box **410**, the water discharged from the filtering box **410** may be directly discharged from the rear portion of the cleaning device body **100** or discharged from the rear portion of the cleaning device body **100** through the propeller **310** without being obstructed by other components (for example, the water quality treatment assembly **810** and/or the drive box **130**) on the rear portion. Therefore, a possibility that water flows out from positions (for example, the second side portion **1012** or the third side portion **1013**) on the cleaning device body **100** other than the rear portion is reduced. This prevents water flowing out from other positions from pushing uncleaned debris away from the cleaning device body **100**.

[0265] In some embodiments, at least two propellers **310** are respectively disposed on two sides of the cleaning device body **100**. For example, one propeller **310** is disposed on the second side portion **1012**, and the other propeller **310** is disposed on the third side portion **1013**. Because the propellers **310** are disposed on the two sides of the cleaning device body **100**, a large torque is provided, so that flexibility of direction adjustment of the cleaning device **1000** is improved.

[0266] In an embodiment, the cleaning device **1000** further includes a water flow channel **3101**. The propeller **310** is disposed in the water flow channel **3101**. Different propellers **310** may be disposed in different water flow channels **3101**. The water flow channel **3101** may be cylindrical or may be in other shapes. The water flow channel **3101** is provided to guide the water flowing

through the propeller **310**, so that the water flows through the propeller **310** more stably. This improves propulsion efficiency. In a specific embodiment, in the forward direction of the cleaning device **1000**, at least one water inlet of the water flow channel **3101** is located at the front portion of the cleaning device body **100**, and at least one water outlet of the water flow channel **3101** is located at the rear portion of the cleaning device body **100**.

[0267] In a specific embodiment, the water flow channel **3101** may be provided with at least one opening **3102**. When there is gas around the water flow channel **3101**, the gas may be discharged from the cleaning device body **100** through the opening **3102**. In this way, the following case can be avoided: Amounts of gas at different positions (for example, the second side portion **1012** and the third side portion **1013**) on the cleaning device body **100** are different, causing heights of different positions on the cleaning device body **100** to be inconsistent when the cleaning device **1000** operates in water.

[0268] In a specific embodiment, a quantity of propellers **310** is greater than two, and the quantity of propellers **310** is increased, so that a movement speed of the cleaning device **1000** is increased. Alternatively, the quantity of propellers **310** is less than or equal to two, and a rotation speed of the propeller **310** is increased (for example, a rotation speed of a drive motor of the propeller **310** is greater than or equal to 1000 r/min), so that the movement speed of the cleaning device **1000** is increased. The cleaning device body **100** moves relative to a water flow, so that the water flow and debris are drawn into the debris inlet **413**. In this case, because a pushing force applied by the cleaning device **1000** to the water flow has not yet acted on the debris, a possibility that the debris is pushed away by the water flow is reduced. This improves debris cleaning efficiency of the cleaning device **1000**.

[0269] In a specific embodiment, the water quality treatment assembly **810** and/or the drive box **130** may be disposed at the bottom of the filtering box **410**. Based on this disposition manner, water can normally flow through the filtering box **410** without being affected. In addition, when the cleaning device **1000** operates in water, the bottom of the filtering box **410** is usually immersed in water. Accordingly, the water quality treatment assembly **810** and/or the drive box **130** disposed at the bottom of the filtering box **410** are/is also immersed in water, so that the water quality treatment assembly **810** and/or the drive box **130** can be cooled to some extent.

[0270] In a specific embodiment, the debris inlet **413** includes a gradually expanding structure **4133**. The gradually expanding structure **4133** is a structure of the debris inlet **413** and in an expanded state (for example, in a flared state). The gradually expanding structure **4133** is configured to guide the water flow and expand a range from which the debris enters the debris inlet **413**. This improves the cleaning effect of the cleaning device **1000**. Refer to FIG. **49***b*. In a specific embodiment, at least a part of the gradually expanding structure **4133** may protrude from the accommodating opening **102** (not shown), or an outermost side of the gradually expanding structure **4133** is flush with the accommodating opening **102**. An expansion angle of the gradually expanding structure **4133** may be greater than or equal to 45° to avoid the following case: The expansion angle is too small, causing the debris to be pushed away by the debris inlet **413**.

[0271] In some embodiments, the adjustment mechanism **200** of the cleaning device **1000** includes a first buoyancy cavity **211** and a second buoyancy cavity **212** at least partially symmetrically provided at the cleaning device body **100**. Stability of a buoyancy force applied to the cleaning device **1000** can be improved by using the two buoyancy cavities **210** at least partially symmetrically provided, so that a phenomenon that the cleaning device **1000** topples and deflects due to an uneven buoyancy force is less likely to occur. The top cover **107** is fixedly connected to the first buoyancy cavity **211** and the second buoyancy cavity **212**, that is, the top cover **107** does not need to be opened. The top cover **107** is directly fixed on the first buoyancy cavity **211** and the second buoyancy cavity **212**, so that stability of the solar mechanism **600** is improved, thereby improving a service life of the solar mechanism **600**.

[0272] A structure of the first buoyancy cavity **211** is at least partially the same as that of the

second buoyancy cavity **212**. In this embodiment, the structure of the first buoyancy cavity **211** is the same as that of the second buoyancy cavity **212**. The first buoyancy cavity **211** may be configured to accommodate liquid and/or gas. The buoyancy cavity **210** may further be, but is not limited to, an inflatable buoyancy cavity, a liquid-containing buoyancy cavity, a partitioned buoyancy cavity, or the like. A volume of the buoyancy cavity **210** may be preset. The buoyancy cavity **210** may be made of a rigid material. The rigid material may include, but is not limited to, glass, ceramics, phenolic plastic, polyurethane plastic, epoxy plastic, unsaturated polyester plastic, and the like. For example, the buoyancy cavity **210** may be of a two-layer structure: an inner layer and an outer layer. The inner layer may be made of a flexible material and is configured to accommodate liquid and/or gas. The outer layer is a rigid protective housing and may be configured to provide protection and stability for the inner layer.

[0273] In some embodiments, the adjustment mechanism **200** of the cleaning device **1000** may include a buoyancy adjustment part (not shown). The buoyancy adjustment part may be the buoyancy cavity pump **220**. The buoyancy adjustment part may be configured to adjust the volume of gas in the buoyancy cavity **210**. The volume of gas/liquid in the buoyancy cavity **210** may be adjusted by the buoyancy adjustment part to change a buoyancy force applied to the cleaning device **1000** in the vertical direction. For example, for the multi-functional cleaning device, poses of the cleaning device **1000** under the water and on the water surface may be switched by adjusting the volume of the gas or the liquid in the buoyancy cavity **210**. The buoyancy adjustment part may be various structures that can adjust the volume of the gas or the liquid in the buoyancy cavity **210**. The buoyancy cavity pump **220** may be, but is not limited to, a pneumatic pump, a hydraulic pump, an electric pump, or the like. The buoyancy cavity pump **220** may alternatively be a piston assembly provided at the buoyancy cavity **210**.

[0274] In some embodiments, an auxiliary mounting groove **109** is provided at a front end of the first buoyancy cavity **211**. An auxiliary mounting portion **110** is provided in the auxiliary mounting groove **109**. The front end and/or a rear end of the first buoyancy cavity **211** are/is provided with an anti-collision groove **213**. The anti-collision groove **213** is provided with a first anti-collision part **111**. A position of the auxiliary mounting groove **109** and a position of the anti-collision groove **213** may be determined as required. In addition, a propulsion groove **214** is provided at a rear portion of the first buoyancy cavity **211**. The propulsion groove **214** is configured to mount the propeller **310**.

[0275] FIG. **38***a* is a schematic structural view of the cleaning device according to a seventh embodiment of the present disclosure. FIG. **39** is a schematic structural view of a portion F shown in FIG. **38***a*. FIG. **40** is a schematic structural view of a portion G shown in FIG. **38***a*. In some embodiments, the cleaning device **1000** includes the first anti-collision part **111**. The first anti-collision part **111** is provided at the cleaning device body **100**. In addition, the first anti-collision part **111** at least partially protrudes from the contour of the cleaning device body **100**. When the cleaning device **1000** collides with the side wall of the pool, an attitude change of the cleaning device **1000** can be reduced by using the first anti-collision part **111**, thereby improving operation stability of the cleaning device **1000**. In addition, the first anti-collision part **111** plays a cushioning role to reduce damage to the pool caused by the cleaning device **1000** and damage to the cleaning device **1000** caused by colliding with the edge of the pool, thereby improving the service life.

[0276] There may be one, two, three, four, or a plurality of first anti-collision parts **111**. For example, in this embodiment, there are four first anti-collision parts **111**, and the four first anti-collision parts **111** are provided at four corners of the cleaning device body **100** respectively. The four first anti-collision parts **111** may be provided at the front end and/or the rear end of each of the first buoyancy cavity **211** and the second buoyancy cavity **212**. A size of the first anti-collision part **111** may be set based on an actual requirement. In this embodiment, the size of the first anti-collision part **111** at the front end of the cleaning device **1000** is larger than the size of the first anti-collision part **111** at the rear end of the cleaning device **1000**.

[0277] In some embodiments, the first anti-collision part **111** may be rotatably provided at the

cleaning device body **100** and play a guiding role. The first anti-collision part **111** includes at least a guiding wheel (not shown) and a guiding shaft (not shown). The guiding shaft passes through and is connected to the guiding wheel. The guiding wheel is rotatably connected to the cleaning device body **100** through the guiding shaft. When the first anti-collision part **111** is provided at the first buoyancy cavity **211**, the first buoyancy cavity **211** is recessed to form the anti-collision groove **213**, the guiding shaft is rotatably connected to the anti-collision groove **213**, and the guiding wheel at least partially protrudes from the first buoyancy cavity **211**. Similarly, the second buoyancy cavity **212** may be provided with the above structure of the first buoyancy cavity **211**.

[0278] The guiding wheel includes a guiding hub and a guiding strip. The guiding shaft passes through and is connected to the guiding hub. The guiding strip encloses a periphery of the guiding hub. The guiding hub is disposed in the cleaning device body **100**. The guiding strip at least partially protrudes from the cleaning device body **100**. The guiding strip is a flexible strip. The flexible strip may be, but is not limited to, a rubber strip, an elastic cloth strip, or the like.

[0279] In some embodiments, the cleaning device **1000** includes at least one distance measurement sensor configured to detect a distance between the cleaning device **1000** and an obstacle for identifying the obstacle. For example, the distance measurement sensor is an ultrasonic sensor or an infrared sensor. As shown in FIG. **38***a*, the cleaning device **1000** includes a plurality of distance measurement sensors, such as at least two overwater sensors **320** and/or at least one underwater sensor **330**. When the cleaning device **1000** is located on the water surface, the overwater sensors **320** are located above the water surface, and the underwater sensor **330** is located below the water surface. In some embodiments, the at least two overwater sensors **320** may be disposed symmetrically at the first side portion **1011** of the cleaning device **1000** to detect an object in front of the cleaning device **1000** on the water surface, and the at least one underwater sensor **330** may be disposed at the second side portion **1012** and/or the third side portion **1013** to detect an object on a side of the cleaning device **1000** in the water. The underwater sensor **330** is disposed at the second side portion **1012** and/or the third side portion **1013** to detect a boundary of the to-be-cleaned region when the cleaning device **1000** moves along the edge. In addition, because the underwater sensor **330** can detect a low region in the vertical direction, when the boundary of the to-be-cleaned region has a slope, the underwater sensor **330** is closer to the boundary of the to-be-cleaned region and detects the boundary of the to-be-cleaned region more easily. In some embodiments, a receiving end and a transmitting end of the overwater sensor **320** are separated from each other to expand a range of receiving a signal by the receiving end and a range of transmitting a signal by the transmitting end, so that a problem of a large dead zone of a low-frequency sensor is avoided. A plurality of distance measurement sensors with different orientations are disposed, so that a detection range of the cleaning device **1000** can be improved. Especially, sensors are disposed at the first side portion **1011** and the second side portion **1012** and/or the third side portion **1013** to perform detection in the forward direction of the cleaning device and perform detection on a side of the cleaning device **1000** in the water.

[0280] In some embodiments, the cleaning device **1000** includes the first auxiliary cleaning assembly **510** and the first anti-collision part **111**. When the first auxiliary cleaning assembly **510** and the first anti-collision part **111** are provided at the front portion of the cleaning device body **100**, the first auxiliary cleaning assembly **510** may be located above the first anti-collision part **111**, or the first auxiliary cleaning assembly **510** may be located below the first anti-collision part **111**. In other words, the first auxiliary cleaning assembly **510** and the first anti-collision part **111** may be arranged substantially parallel to each other or arranged substantially vertically. Substantially parallel arrangement or substantially vertical arrangement indicates that in the height direction of the cleaning device **1000**, a projection range of the first auxiliary cleaning assembly **510** at least partially overlaps with a projection range of the first anti-collision part **111**. A position relationship between the first auxiliary cleaning assembly **510** and the first anti-collision part **111** may be set as required.

[0281] Specifically, the side brush **511** and the first anti-collision part **111** both at least partially protrude from the outer contour of the cleaning device body **100**. On a projection plane substantially parallel to the reference plane **1**, an area of the side brush **511** protruding from the outer contour of the cleaning device body **100** is larger than an area of the first anti-collision part **111** protruding from the outer contour of the cleaning device body **100**. In other words, a distance over which the side brush **511** protrudes from the cleaning device body **100** is larger than a distance over which the guiding wheel protrudes from the cleaning device body **100**.

[0282] In an embodiment, on the projection plane substantially parallel to the reference plane **1**, a projection boundary of the guiding wheel is at least partially located between a projection boundary of the hub **513** of the side brush **511** and a projection boundary of the cleaning portion **5111**, or the projection boundary of the guiding wheel is at least partially located within the projection boundary of the side brush **511**, that is, when the cleaning device **1000** is in contact with an obstacle, the side brush **511** is first in contact with the obstacle and is deformed, and then the guiding wheel is in contact with the obstacle. In this way, the cleaning portion **5111** of the side brush **511** can effectively clean the wall of the pool, and when the cleaning device **1000** is too close to the wall of the pool, the guiding wheel can also play an anti-collision role.

[0283] In some embodiments, in a same radial direction, a difference between a tangent length of the side brush **511** at least partially protruding from the outer contour of the cleaning device body **100** and a tangent length of the first anti-collision part **111** at least partially protruding from the outer contour of the cleaning device body **100** is a tangent difference. The tangent difference is greater than 0 and less than or equal to 3 mm. The range of the tangent difference is limited, so that the side brush **511** can operate normally, that is, clean a region such as the side wall or a corner of the pool. In addition, the first anti-collision part **111** can play a cushioning role to reduce an attitude change of the cleaning device. The tangent difference may be, but is not limited to, 0.5 mm, 0.9 mm, 1 mm, 1.5 mm, 1.9 mm, 2.5 mm, 3 mm, or the like. During an actual process, when the tangent difference is too large, and the side brush drive motor is the stepper motor, the side brush **511** is squeezed to the side wall of the pool, and the first anti-collision part **111** is not in contact with the side wall of the pool. In this case, the stepper motor may generate abnormal noise. Therefore, the tangent difference cannot be too large. In other words, the tangent difference may be set based on an actual requirement. In different radial directions, the tangent differences may be equal or unequal.

[0284] FIG. **38***b* is a schematic structural view of the cleaning device according to an eighth embodiment of the present disclosure. Refer to FIG. **38***b*. In this embodiment, there are six first anti-collision parts **111**, and the six first anti-collision parts **111** are respectively provided at four corners of the cleaning device body **100**, the second side portion **1012**, and the third side portion **1013**. A size of the first anti-collision part **111** may be determined as required. In this embodiment, the size of the first anti-collision part **111** at the front end of the cleaning device **1000** is larger than the size of the first anti-collision part **111** at another position on the cleaning device **1000**. A distance over which the first anti-collision part **111** protrudes from the cleaning device body **100** may be determined as required. In this embodiment, a protruding distance of the first anti-collision part **111** at the front end of the cleaning device **1000** is larger than that of the first anti-collision part **111** at another position on the cleaning device **1000**. A manner in which the first anti-collision part **111** protrudes from the cleaning device body **100** may be that the cleaning device body **100** is provided with an extension mechanism **113**. A first end of the extension mechanism **113** is provided on the cleaning device body **100**, a second end of the extension mechanism **113** protrudes from the contour of the cleaning device body **100**, and the first anti-collision part **111** may be rotatably provided at the second end of the extension mechanism **113**, so that the distance over which the first anti-collision part **111** protrudes from the cleaning device body **100** is increased. In this way, an anti-collision range of the first anti-collision part **111** is increased.

[0285] In some embodiments, the cleaning device **1000** includes a second anti-collision part **112**. A

part of the cleaning device body **100** is exposed on the water surface when the cleaning device body **100** moves on the water surface, and the second anti-collision part **112** may be provided at the part, such as a most protruding part of the front portion and/or the rear portion of the outer contour of the cleaning device body **100**, where the outer contour is exposed on the water surface. If the cleaning device **1000** includes the first auxiliary cleaning assembly **510** and the second anti-collision part **112**, one part of the first auxiliary cleaning assembly **510** is located on the water surface, and the other part of the first auxiliary cleaning assembly **510** is located below the water surface, the second anti-collision part **112** may be disposed at a most protruding part of the outer contour of the cleaning device body **100**, where the most protruding part is located higher than the first auxiliary cleaning assembly **510**. The second anti-collision part **112** may be an anti-collision block made of a cushioning material. This is not limited herein. When the cleaning device **1000** collides during moving on the water surface, the second anti-collision part **112** can play a cushioning role, to reduce the damage to the pool caused by the cleaning device **1000** and the damage to the cleaning device **1000** caused by collision, thereby improving the service life.

[0286] In some embodiments, as shown in FIG. **1**, the cleaning device **1000** includes a third anti-collision part **114**. The third anti-collision part **114** is provided on a side portion of the cleaning device **1000**, such as the second side portion **1012** and/or the third side portion **1013**, to play a cushioning role for the side portion. This reduces the damage to the pool caused by the cleaning device **1000** and the damage to the cleaning device **1000** caused by collision, thereby improving the service life. The third anti-collision part **114** may be, but is not limited to, a rubber strip.

[0287] In some embodiments, the drive box **130** is provided with a vibrator (not shown). Because the drive box **130** is a sealed cavity, the vibrator may transmit sound in the sealed cavity to the outside of the cleaning device **1000**, to remind the user to perform a relevant operation.

[0288] In some embodiments, FIG. **50***a* is a partial structural view of the cleaning device according to an embodiment of the present disclosure, and FIG. **50***b* is a partial structural view of the cleaning device according to an embodiment of the present disclosure. Refer to FIG. **38***b*. The cleaning device **1000** includes a light-emitting structure **900**. The light-emitting structure **900** may indicate a current state (for example, a current operation state, a fault state, network configuration, and a battery level) of the cleaning device **1000**. In addition, in low visibility, visibility of the cleaning device **1000** can be improved by using the light-emitting structure **900**. A quantity of light-emitting structures **900** and a position of the light-emitting structure **900** may be determined based on an actual requirement. In an embodiment, the light-emitting structure **900** may be disposed at any position on the first side portion **1011**, for example, an edge of the front portion of the cleaning device body **100** or a middle position on the front portion. In another embodiment, the light-emitting structure **900** may be disposed at an intersection point between the first side portion **1011** of the cleaning device body **100** and the top of the cleaning device body **100**. In an embodiment, the cleaning device **1000** may be provided with only one light-emitting structure **900**, or one light-emitting structure **900** may be disposed at each of different positions (for example, on two sides of the first side portion **1011**, or on the second side portion **1012** and the third side portion **1013**).

[0289] In an embodiment, the light-emitting structure **900** includes at least one light-emitting part **901**. The light-emitting part **901** may emit light constantly or flicker. The emitted light may be in a single color or a plurality of colors. For example, the light-emitting part **901** may emit light of different colors based on a current state of the cleaning device **1000**. The light-emitting part **901** may be, but is not limited to, an LED light.

[0290] In an embodiment, the light-emitting structure **900** further includes at least one light transmission part **902**. The light transmission part **902** may be disposed on a surface of the cleaning device body **100** and configured to transmit, to the outside of the cleaning device body **100**, the light emitted by the light-emitting part **901**. The light transmission part **902** may be made of glass, plastic, or other materials having light transmission performance. The light transmission part **902** is disposed, so that the light-emitting structure **900** can be disposed inside the cleaning device body

100, to prevent the light-emitting structure **900** from being exposed to an external environment. When the cleaning device **1000** operates in a pool or another humid environment, the light transmission part **902** is disposed, so that the following case can be effectively avoided: The light-emitting structure **900** is damaged because water enters the light-emitting structure **900** or the light-emitting structure **900** is hit. This extends a service life of the light-emitting structure **900**.

[0291] In one embodiment, the light-emitting structure **900** further includes a light guiding part **903**. The light guiding part **903** is configured to guide, to a position at which the light transmission part **902** is located, the light emitted by the light-emitting part **901**. Specifically, the light-emitting part **901** is connected to at least one end of the light guiding part **903**. When the light-emitting part **901** emits light, the emitted light may be guided by the light guiding part **903** to a position at which the light guiding part **903** is located. If the light transmission part **902** is disposed at the light guiding part **903**, the light guided by the light guiding part **903** may be transmitted through the light transmission part **902** to the outside of the cleaning device body **100**. In this case, the light-emitting part **901** and the light transmission part **902** may be disposed in a staggered manner to prevent the light-emitting part **901** from being directly placed at the light transmission part **902**. Based on the above disposition, the light-emitting part **901** can be sealed inside the cleaning device body **100** to prevent the light-emitting part **901** from being damaged due to being in contact with water. This improves operation stability of the light-emitting structure **900**. In addition, the light guiding part **903** may be in different shapes and of different lengths, so that a light-emitting range of the light-emitting part **901** can be expanded. This optimizes a light emitting effect. The light guiding part **903** may be made of any light guiding material such as optical glass, an optical crystal, or optical plastic.

[0292] Refer to FIG. **50***b*. In some specific embodiments, the light transmission part **902** and the light guiding part **903** are integral structure, or a part of the light guiding part **903** is located on the surface of the cleaning device body **100**, and another part is located inside the cleaning device body **100**, so that the light guiding part **903** can both guide light and transmit light. Based on the above disposition, a gap between the light transmission part **902** and the light guiding part **903** is avoided, so that the following case can be avoided: Mist is formed due to interaction between heat generated when the light-emitting part **901** emits light or heat inside the cleaning device body **100** and water entering the cleaning device body **100**, causing the mist to exist between the light transmission part **902** and the light-emitting part **901**. This avoids affecting an effect that the light passes through the light transmission part **902**. In addition, because the mist and water drops into which the mist condenses on the light transmission part **902** are usually located inside the cleaning device body **100**, it is difficult for the user to remove the mist and the water drops from the outside of the cleaning device body **100**. Based on the above disposition, impact on user experience is avoided. In some specific embodiments, the light guiding part **903** may be provided with a refraction structure, such as a sawtooth structure, to improve a light guiding effect. In this way, the light can be effectively guided to a specified position.

[0293] FIG. **41***a* is a schematic structural view of an anti-stranding assembly of the cleaning device according to the first embodiment of the present disclosure. In some embodiments, the cleaning device **1000** includes an anti-stranding assembly **140**. The anti-stranding assembly **140** is provided at the bottom of the cleaning device body **100**. The anti-stranding assembly **140** has a first state and a second state. When the anti-stranding assembly **140** is in the first state, the anti-stranding assembly **140** is in an open state relative to the cleaning device body **100**, and interference occurs between the anti-stranding assembly **140** and a step in the pool and other structures to prevent the cleaning device **1000** from rushing to a shallow water region or going ashore. In this way, the anti-stranding assembly **140** plays an anti-stranding role. When the anti-stranding assembly **140** is in the second state, the anti-stranding assembly **140** is in a closed state relative to the cleaning device body **100**, and the anti-stranding assembly **140** is stored.

[0294] The anti-stranding assembly **140** may be telescopically connected to the bottom of the

cleaning device body **100**. When the anti-stranding assembly **140** is in the first state, the anti-stranding assembly **140** extends out of the bottom of the cleaning device body **100**, and when the anti-stranding assembly **140** is in the second state, the anti-stranding assembly **140** is retracted into the bottom of the cleaning device body **100**. Alternatively, when the anti-stranding assembly **140** is in the first state, the anti-stranding assembly **140** is unfolded and extends out of the bottom of the cleaning device body **100**, and when the anti-stranding assembly **140** is in the second state, the anti-stranding assembly **140** is folded and stored at the bottom of the cleaning device body **100**. In this way, the anti-stranding function of the cleaning device **1000** is implemented. The anti-stranding assembly **140** is provided at a position on the bottom of the cleaning device body **100**, and the position is close to a front end of the cleaning device body **100**. The anti-stranding assembly **140** may alternatively be provided at four corners at the bottom of the cleaning device body **1000**.

[0295] In an embodiment, the anti-stranding assembly **140** may include an anti-stranding housing **141**, an anti-stranding part **142**, and a pressed elastic portion **143**. The anti-stranding housing **141** is provided in the front end of the cleaning device body **100**, and the front end is close to the bottom of the cleaning device body **100**. The anti-stranding part **142** may be pulled out from the anti-stranding housing **141** and may extend out of or be retracted into the anti-stranding housing **141**. The pressed elastic portion **143** may be elastically provided at an outer side portion of the anti-stranding part **142**. When the anti-stranding assembly **140** needs to be used, an external force is applied to the anti-stranding part **142**, and the anti-stranding part **142** and the pressed elastic portion **143** both extend out of the cleaning device body **100**. In this case, the pressed elastic portion **143** is clamped at the bottom of the front end of the cleaning device body **100** to lock the anti-stranding part **142**. When the anti-stranding assembly **140** does not need to be used, the pressed elastic portion **143** is compressed, and the anti-stranding part **142** extends into the anti-stranding housing **141**. In this case, the anti-stranding part **142** is retracted into the cleaning device body **100**.

[0296] Furthermore, an end of the anti-stranding part **142** is provided with a manual portion **1421**. When the anti-stranding assembly **140** needs to be used, the anti-stranding part **142** can conveniently extend out of the cleaning device body **100** through the manual portion **1421**. When the anti-stranding assembly **140** does not need to be used, the anti-stranding part **142** is retracted into the anti-stranding housing **141**, and the manual portion **1421** can prevent the anti-stranding part **142** from fully retracting into the cleaning device body **100**, thereby improving usage experience.

[0297] During an actual process, the anti-stranding assembly **140** may include the anti-stranding housing **141**, the anti-stranding part **142**, and an anti-stranding drive assembly. The anti-stranding drive assembly is connected to the anti-stranding part **142** and is configured to automatically drive the anti-stranding part **142** to extend out of or retract into the cleaning device body **100**. The anti-stranding drive assembly may include, but is not limited to, a drive motor and the like.

[0298] In some embodiments, the anti-stranding assembly **140** may include an anti-stranding wheel **1401**. FIG. **41***b* is an exploded view of the anti-stranding assembly of the cleaning device according to the first embodiment of the present disclosure. The anti-stranding wheel **1401** may be rotatably provided at the bottom of the anti-stranding assembly **140** or may be, but is not limited to, provided at the bottom of the anti-stranding part **142**. When the anti-stranding assembly **140** is in the first state and/or the second state, the anti-stranding wheel **1401** may protrude from an outer contour of the anti-stranding assembly **140**. For example, when the anti-stranding assembly **140** extends out of the bottom of the cleaning device body **100**, the anti-stranding wheel **1401** protrudes from the outer contour of the anti-stranding assembly **140**. When the anti-stranding assembly **140** is retracted into the cleaning device body **100**, the anti-stranding wheel **1401** is also retracted into the outer contour of the anti-stranding assembly **140**. Alternatively, regardless of whether the anti-stranding assembly **140** is retracted into the cleaning device body **100**, the anti-stranding wheel **1401** always protrudes from the outer contour of the anti-stranding assembly **140**. This is not limited herein. The anti-

stranding wheel **1401** is provided, so that the cleaning device body **100** can move forward, backward, leftward, and rightward to escape from the trap when the cleaning device body **100** is stranded, thereby improving a capability of escaping from the trap.

[0299] The third embodiment of the present disclosure further provides a control method for the cleaning device. The control method is used to control the cleaning device **1000**. Specifically, the control method may include the following steps. Step S**900**: Detect that the cleaning device currently meets a triggering condition for a telescopic movement.

[0300] In some embodiments, the triggering condition for the telescopic movement includes at least one of the following conditions. The first triggering condition for the telescopic movement is that a distance between the cleaning device **1000** and a target object is within a preset distance range. The target object includes at least one of a wall and an obstacle. The second triggering condition for the telescopic movement is that the cleaning device **1000** is in a trapped state. A condition in which it is detected that the cleaning device **1000** is in the trapped state may include, but is not limited to, the following conditions. First, a second trigger sensor of the cleaning device **1000** collects second sensing data, and it is determined that there is a preset deviation between an actual rotation angle of the cleaning device **1000** and a preset rotation angle of the cleaning device **1000**. Then, it is detected that the cleaning device **1000** does not move for a target distance after moving for a first time. Further, it is detected that a difference between a position of the cleaning device **10** relative to a reference point before a second time and a position of the cleaning device **10** relative to the reference point after the second time is within a preset difference range. The reference point is determined by using a third trigger sensor. Finally, a current of the drive motor of the cleaning device **1000** increases, and a current increase meets a current change for a trapped situation. The third triggering condition for the telescopic movement is that the cleaning device **1000** receives a preset instruction. The fourth triggering condition for the telescopic movement is that the cleaning device **1000** is in a preset operation mode. The preset operation mode includes at least one of an energy-saving mode, a return mode, and a charging mode. The return mode indicates that a cleaning operation has been completed and the cleaning device **1000** is in a returning process. It may be understood that the preset operation mode may further include a trap escaping mode and the like other than the above operation modes. This is not limited herein.

[0301] Step S**901**: Control the first auxiliary cleaning assembly of the cleaning device **1000** to move telescopically. The telescopic movement includes at least one of an extension movement along a direction away from the cleaning device body **100** of the cleaning device **1000** and a retraction movement along a direction close to the cleaning device body **100** of the cleaning device **1000**.

[0302] The first auxiliary cleaning assembly **510** of the cleaning device **1000** provided in the present disclosure may rotate around its own axis, move telescopically, and rotate. In other words, the first auxiliary cleaning assembly **510** can move flexibly. This can expand a range of single cleaning of the cleaning device **1000** during cleaning and reduce a cleaning path of the cleaning device **1000**. Therefore, the cleaning efficiency is improved. In addition, when the cleaning device **10** is trapped during cleaning the pool, the first auxiliary cleaning assembly **510** can move flexibly to escape from the trap. A range occupied by the cleaning device **1000** is reduced, so that the cleaning device **1000** escapes from the trap.

[0303] In some embodiments, the cleaning device **1000** includes a main circuit board (not shown). The main circuit board is provided with an inertial measurement mounting portion (not shown). The inertial measurement mounting portion is configured to mount an inertial measurement unit (not shown). The inertial measurement unit is configured to measure action information of the cleaning device **1000**. The action information may include, but is not limited to, an acceleration, angular displacement, and the like. During a process of designing a layout of the printed circuit board, namely, the PCB layout design, a periphery of the inertial measurement mounting portion is hollowed, and the inertial measurement unit is mounted at a hollowed edge of the inertial

measurement mounting portion, to resolve a problem of zero drift of the inertial measurement unit caused by deformation of the main circuit board.

[0304] In some embodiments, the cleaning device **1000** may be, but is not limited to, recalled in a one-button manner by using an electronic device such as a mobile phone, or a remote control. In an embodiment, the cleaning device **1000** includes a communication assembly, such as a Wi-Fi communication assembly (not shown) and a Bluetooth assembly (not shown). The Wi-Fi communication assembly has a hot spot function, so that the hot spot function is enabled to call the cleaning device **1000**. The electronic device is connected to the Wi-Fi communication assembly and the Bluetooth assembly. The electronic device is connected to the Wi-Fi communication assembly, that is, an APP on the electronic device APP is configured to be connected to the Wi-Fi communication assembly, and then the cleaning device **1000** is configured to be connected to a Wi-Fi router. When the cleaning device **1000** needs to be recalled, a recall button of the APP on the electronic device is directly tapped. When the cleaning device **1000** receives the above instruction, the cleaning device **1000** may automatically dock at an edge of the pool. In other embodiments, the cleaning device **1000** may alternatively be controlled remotely through a remote control.

[0305] In some embodiments, the communication assembly is located on an upper side of the first buoyancy cavity **211** or at any position located on an upper side of the second buoyancy cavity **211**, where the position is close to the top of the cleaning device body **100**, so that when the cleaning device **1000** is located on the water surface, the communication assembly is located above the liquid surface. This facilitates establishment of a communication connection between the communication assembly and the electronic device. The communication assembly may alternatively be disposed in the drive box **130** or another confined space, and an antenna connected to the communication assembly may be disposed adjacent to or at the top of the cleaning device body **100**, so that when the cleaning device **1000** is located on the water surface, the antenna is located above the liquid level. In this way, the communication assembly can transmit and receive data through the antenna, and a communication connection is established between the communication assembly with a communication device. A control system may be disposed in the drive box **130**, and the interior of the drive box **130** is a closed or sealed area. The control system is disposed in the drive box **130**, to prevent water from entering the control system, so that problems, such as a short circuit and damage to an electronic component of the control system, can be avoided.

[0306] The present disclosure further provides a control method for a cleaning device. The cleaning device **1000** further includes a current collection module and an energy storage mechanism. The energy storage mechanism may be the battery pack and/or the electrical component described above. The control method for the cleaning device includes the following steps. Step S**910**: Control the moving mechanism to move along a zigzag route and obtain a present charging current of the solar mechanism. The moving mechanism **300** is configured to drive the cleaning device body **100** to move. The moving mechanism **300** moves in the pool along the zigzag route, and the solar mechanism **600** of the cleaning device **1000** is at least partially located on the water surface. A speed of finding an optimal energy supplement point can be improved based on the zigzag route, and an operation manner is flexible and reliable. The current collection module obtains the present charging current of the solar mechanism **600** in real time. Step S**911**: In a case where the present charging current is greater than or equal to a first target charging current, control the moving mechanism to stop moving and control the solar mechanism to charge the energy storage mechanism. The first target charging current is a preset value, which may be determined based on an actual requirement. For example, when the first target charging current is 1 A, the present charging current is greater than or equal to 1 A. The first target charging current may be a first target charging current threshold. The present charging current is equal to or greater than the first target charging current threshold, all of which meet requirements. When the present charging current is greater than or equal to the first target charging current, the present charging current

meets a charging requirement, the moving mechanism stops moving, and the solar mechanism is controlled to charge the energy storage mechanism, so that energy is supplemented to the cleaning device at a position at which the present charging current meets the requirement. The moving mechanism is controlled to move along the zigzag route, and when the present charging current of the solar mechanism is greater than or equal to the first target charging current, the cleaning device stops moving, and the solar mechanism is controlled to charge the energy storage mechanism, so that a speed at which the cleaning device finds the optimal energy supplement point can be improved. In this way, the cleaning device is charged.

[0307] The control method for the cleaning device further includes the following step S**912**. Step S**912**: In a case where the present charging current is less than the first target charging current, cyclically perform the following sub-steps until the moving mechanism has traversed a target detection region, or charging is performed. The target detection region may be a partial or entire region of the pool. When the present charging current is less than the first target charging current, the present charging current cannot meet the charging requirement. In this case, the following sub-steps, such as step S**9120**, step S**9121**, step S**9122**, and step S**9123**, or step S**9124**, step S**9125**, step S**9126**, and step S**9127**, are cyclically performed until the optimal energy supplement point is found to charge the cleaning device. Alternatively, the above sub-steps are cyclically performed until the moving mechanism has traversed the target detection region, and the optimal energy supplement point has not been found.

[0308] Step S**912** includes the following sub-steps. Step S**9120**: Control the moving mechanism to continue to move and count movement duration of the continued movement. The movement duration is duration for which the moving mechanism drives the cleaning device to move. When the present charging current is less than the first target charging current, the movement duration of the cleaning device is counted. Step S**9121**: In a case where the movement duration corresponding to the present movement reaches a duration threshold, obtain the present charging current of the solar mechanism. The duration threshold is a preset value, which may be determined based on an actual requirement. For example, the duration threshold may be 5 minutes, that is, the movement duration of the cleaning device is 5 minutes. Within the duration threshold, the present charging current of the solar mechanism is obtained in real time. Step S**9122**: In a case where the present charging current is greater than or equal to a second target charging current after the movement duration, control the moving mechanism to stop moving and control the solar mechanism to charge the energy storage mechanism. The second target charging current is a preset value, which may be determined based on an actual requirement. The second target charging current is less than the first target charging current. When the present charging current within the duration threshold is greater than or equal to the second target charging current, the present charging current meets the charging requirement, the moving mechanism stops moving, and the solar mechanism is controlled to charge the energy storage mechanism, so that energy is supplemented to the cleaning device at a position at which the present charging current meets the requirement. Step S**9123**: In a case where the present charging current is less than the second target charging current after the movement duration, control the moving mechanism to continue to move. When the present charging current within the duration threshold is less than the second target charging current, the present charging current cannot meet the charging requirement, and the moving mechanism continues to move to find the optimal energy supplement point. The first target charging current corresponding to a previous movement is greater than the second target charging current corresponding to the present movement. For example, in a case where the moving mechanism moves for a first time, and the first target charging current is 2 A, when the obtained present charging current of the solar mechanism is greater than or equal to 2 A, the cleaning device is charged for supplementing energy. When the present charging current is less than 2 A, the moving mechanism continues to perform the present movement, and the duration threshold is 5 minutes. In this case, the second target charging current is 1.5 A. When the obtained present charging current of the solar mechanism is

greater than or equal to 1.5 A, the cleaning device is charged for supplementing energy. When the present charging current is less than 1.5 A, the moving mechanism continues to move for a next time, and a third target charging current is determined to be 1 A. The foregoing operations are repeated until the moving mechanism has traversed the target detection region or the energy supplement point is found to perform charging. In this way, the sub-steps are performed cyclically, and the target charging current is gradually decreased, to find the optimal energy supplement point, thereby improving the charging efficiency of the cleaning device.

[0309] Step S**912** may further include the following sub-steps. Step S**9124**: Control the moving mechanism to continue to move until the moving mechanism has traversed the target detection region, and count a plurality of charging currents of the solar mechanism at various positions in a present movement route. Step S**9125**: In a case where the plurality of charging currents are all less than the first target charging current, determine a maximum charging current in the plurality of charging currents. Step S**9126**: Control the moving mechanism to move in the target detection region again and obtain the second present charging current of the solar mechanism. The second present charging current is a present charging current obtained when the moving mechanism moves in the target detection region again. Step S**9127**: In a case where the second present charging current is greater than or equal to the maximum charging current, control the moving mechanism to stop moving and control the solar mechanism to charge the energy storage mechanism. For example, in a case where the first target charging current is 1 A, if the charging currents are all less than 1 A until the moving mechanism has traversed the target detection region, the maximum charging current in the plurality of charging currents, for example, 0.9 A, is determined. The moving mechanism is controlled to move in the target detection region again. When the moving mechanism moves to a position at which the second present charging current is greater than or equal to 0.9 A, the moving mechanism is controlled to stop moving, and the solar mechanism is controlled to charge the energy storage mechanism. The above sub-steps are performed, so that when the present charging current cannot meet the target charging current, the optimal energy supplement point is found in the target detection region, thereby improving the charging efficiency of the cleaning device.

[0310] The present disclosure further provides a control method for a cleaning device. The cleaning device **1000** further includes a current collection module and an energy storage mechanism. The energy storage mechanism may be the battery pack and/or the electrical component. The control method for the cleaning device includes the following steps. Step S**920**: Control the moving mechanism to move along a zigzag route and obtain a plurality of charging currents of the solar mechanism at various positions in a moving route respectively. The moving mechanism **300** is configured to drive the cleaning device body **100** to move. The moving mechanism **300** moves in the pool along the zigzag route, and the solar mechanism **600** of the cleaning device **1000** is at least partially located on the water surface. A movement speed of finding an optimal energy supplement point can be increased based on the zigzag route, and an operation mode is flexible and reliable. The current collection module obtains the plurality of charging currents at the various positions of the solar mechanism along the moving route. Step S**921**: Count a quantity of charging currents that are greater than a first target charging current. The first target charging current is a preset value, which may be determined based on an actual requirement. For example, when the first target charging current is 1 A, a quantity of positions at which the charging current is greater than or equal to 1 A is counted. Step S**922**: In a case where the quantity is greater than or equal to a quantity threshold, control the moving mechanism stop moving and control the solar mechanism to charge the energy storage mechanism. The quantity threshold is a proportion of a total quantity. The quantity threshold is a preset value, which may be determined based on an actual requirement. For example, the quantity threshold is 20% of the total quantity. The total quantity is a sum of data statistics for the plurality of charging currents of the moving mechanism at various positions along the moving route. When the quantity is greater than or equal to the quantity threshold, the charging

current meets the charging requirement, the moving mechanism stops moving, and the solar mechanism is controlled to charge the energy storage mechanism, so that energy is supplemented to the cleaning device at the position at which the present charging current meets the requirement. Step S**923**: In a case where the quantity is less than the quantity threshold, control the moving mechanism to be in a standby state in situ for preset duration, control the moving mechanism to move along the zigzag route, and obtain the plurality of charging currents of the solar mechanism at the various positions along the moving route. When the quantity is less than the quantity threshold, it is determined that there is insufficient sunlight, and the charging current cannot meet the charging requirement. The moving mechanism stops moving, and the cleaning device is controlled to be in the standby state in situ. The preset duration is duration during which the cleaning device is in the standby state in situ. After the preset duration meets the requirement, the moving mechanism continues to move along the zigzag route, and the above steps are performed. It should be noted that the above quantity may alternatively be an area of the target detection region. The quantity threshold may alternatively be an area proportion of the target detection region. The quantity of charging currents, of the solar mechanism at the various positions along the moving route, greater than the first target charging current is counted, and whether the quantity is greater than the quantity threshold is determined to find the optimal energy supplement point, thereby improving efficiency of the cleaning device in finding the optimal energy supplement point for charging.

[0311] The present disclosure further provides a method for preventing a cleaning device from being trapped. The method for preventing the cleaning device from being trapped includes the following steps. Step S**930**: Obtain a present angle of the cleaning device. The present angle of the cleaning device may be measured through the inertial measurement unit. Step S**931**: Obtain an angle difference between the present angle of the cleaning device and a target angle of the cleaning device. The target angle of the cleaning device is a preset value, which may be determined based on different operation conditions of the cleaning device. Step S**932**: In a case where the angle difference is greater than a preset angle difference, the cleaning device is in a trapped state. The preset angle difference is a preset value. The angle difference is compared with the preset angle difference to determine whether the cleaning device is in the trapped state. Step S**933**: Control the cleaning device to move backward and turn around to escape from the trap. After the cleaning device is in the trapped state, the cleaning device may automatically move backward and turn around to escape from the trap. The cleaning device may move backward and turn around to escape from the trap through a propeller and the like. The angle difference and the preset angle difference are compared, so that whether the cleaning device is in the trapped state can be determined, and the cleaning device can move backward and turn around to escape from the trap. Based on the above method, a capability of the cleaning device to escape from the trap can be improved.

[0312] The present disclosure further provides a method for preventing a cleaning device from being trapped, applied to a situation in which both the front side and the rear side of the cleaning device are close to an obstacle, and therefore, the cleaning device cannot directly rotate in situ to escape from the trap. The method for preventing the cleaning device from being trapped includes the following steps, and a case where the cleaning device moves to the left to escape from the trap is taken as an example. Step S**1030**: Control the cleaning device to move backward until the rear side of the cleaning device abuts against the obstacle. Duration for which the rear side of the cleaning device abuts against the obstacle may last for preset duration, so that the rear side of the cleaning device can be more fully in contact with the obstacle. This is not limited herein. Step S**1031**: Control the cleaning device to rotate to the left. If a moving mechanism is provided at each of two sides of the cleaning device, a propulsion force provided by the right moving mechanism of the cleaning device may be greater than a propulsion force provided by the left moving mechanism of the cleaning device, to improve efficiency of the cleaning device in rotating to the left. Duration for which the cleaning device rotates to the left is controlled to last for the preset duration to

maximize a leftward rotation angle of the cleaning device. This is not limited herein. Step S**1032**: Control the cleaning device to move forward and/or rotate until the front side of the cleaning device abuts against the obstacle. After each time step S**1030**, step S**1031**, and step S**1032** are performed, the cleaning device may be controlled to rotate in situ to determine whether the cleaning device escapes from the trap. If the cleaning device can rotate in situ, an operation of escaping from the trap may be performed. If the cleaning device cannot rotate in situ, step S**1030** to step S**1032** may be performed cyclically until the cleaning device escapes from the trap.

[0313] In an embodiment, a direction of escaping from the trap may be determined based on a distance between the cleaning device and the obstacle. For example, the sensor provided at the cleaning device, such as a distance measurement sensor at the right side of the cleaning device, measures that the distance between the right side of the cleaning device and the obstacle is less than a preset distance, such as 40 cm. In this case, the cleaning device preferentially moves to the left to escape from the trap. Otherwise, the cleaning device preferentially moves to the right to escape from the trap. In this way, the capability of the cleaning device to escape from the trap can be improved. In another embodiment, if the cleaning device includes a side brush, the side brush is controlled to rotate in the direction of escaping from the trap during a process in which the cleaning device escapes from the trap. In this way, when the side brush also abuts against the obstacle, the side brush rotates to assist the cleaning device in improving a rotation capability, so that the capability of the cleaning device to escape from the trap can be improved.

[0314] The present disclosure further provides a method for automatically charging a cleaning device. The method for automatically charging the cleaning device includes the following steps. Step S**940**: Detect a present charging current at a target pool wall of a target region in real time. The target region may be, but is not limited to, a swimming pool, a pool, and the like. Step S**941**: Determine whether the present charging current is a target charging current. The target charging current is a charging current at a wireless charging station. Step S**942**: If the present charging current is the target charging current, perform a charging action. When the present charging current is the target charging current at the wireless charging station, the wireless charging interface of the cleaning device is connected to the wireless charging connector of the wireless charging station for wireless charging. When the solar panel does not meet the charging requirement, the wireless charging interface may be configured to charge the cleaning device on a rainy day, to meet a requirement for cleaning the pool on the rainy day. In this way, whether the present charging current at the target pool wall of the target region is the target charging current is detected in real time. If the present charging current is the target charging current, the wireless charging requirement is met. Step S**942** further includes step S**9421**. Step S**9421**: Performing the charging action includes performing alignment through the automatic alignment assembly and performing charging. The wireless charging interface is aligned with the wireless charging connector through the automatic alignment assembly, to improve accuracy of automatically aligning the wireless charging interface with the wireless charging connector for performing charging. The automatic alignment assembly may be a magnetic attraction automatic alignment assembly. When the cleaning device is charged at the wireless charging station, the magnetic attraction automatic alignment assembly is configured to automatically align the wireless charging interface with the wireless charging connector.

[0315] The present disclosure further provides a method for preventing a cleaning device from regurgitating debris. The method for preventing the cleaning device from regurgitating debris includes the following steps. Step S**950**: Detect a current edge distance between the cleaning device and a side wall of a target region. The cleaning device is provided with an edge sensor. When the cleaning device is located at an edge, the edge sensor may detect a distance between the cleaning device and the side wall of the target region in real time. The edge sensor may be, but is not limited to, an ultrasonic sensor, an infrared sensor, a lidar sensor, a TOF sensor, or the like. Step S**951**: When the current edge distance is less than a preset edge distance, control a movement speed of the

cleaning device. The preset edge distance is a preset value. When the current edge distance is less than or equal to the preset edge distance, the speed of the cleaning device is controlled to gradually decrease or directly decrease to 0, to slow down the cleaning device. Step S**952**: Control the cleaning device to rotate along a first rotation direction, control a side, of the cleaning device, close to a rotation radius to move backward at a first rotation speed, and control a side, of the cleaning device, away from the rotation radius to move forward at a second rotation speed. The first rotation speed is greater than the second rotation speed. The cleaning device has two sides along the forward direction, and each of the two sides is provided with a first propeller. When two first propellers move in opposite directions, the cleaning device may be driven to make a turn. For example, when the first rotation direction is a leftward rotation direction, and the cleaning device moves to a target side wall in front of the cleaning device, the left first propeller rotates in a reverse direction, and the cleaning device moves backward. At the same time, the left first propeller moves at the first rotation speed. The right first propeller rotates in a forward direction, and the cleaning device moves forward. At the same time, the right first propeller moves at the second rotation speed. In this case, the first rotation speed of the left first propeller is less than the second rotation speed of the right first propeller. The cleaning device rotates to the left by limiting rotation of the two first propellers in different directions and at different rotation speeds. During a process in which the cleaning device rotates to the left, a right front side of the cleaning device is close to the side wall of the target region to gather the debris, to ensure that the debris is not lost. Similarly, the cleaning device may rotate to the right. Details are not described herein again. Step S**953**: Control the side, of the cleaning device, away from the rotation radius to move forward at a third rotation speed, and control the side, of the cleaning device, close to the rotation radius to move backward at a fourth rotation speed. The third rotation speed is greater than the fourth rotation speed. When the cleaning device is not close to the target side wall, the cleaning device rotates to the left. The right first propeller continues to move forward at the third rotation speed and speeds up, and the left first propeller continues to move backward at the fourth rotation speed and speeds down, so that the cleaning device can keep rotating to the left to gather the debris, and the debris is not regurgitated. In addition, the cleaning device can turn around along a bow-shaped path (the bow-shaped path means that two adjacent paths are parallel to each other, and forward directions of the cleaning device are opposite to each other).

[0316] The present disclosure further provides a method for preventing a cleaning device from regurgitating debris. The method for preventing the cleaning device from regurgitating debris includes the following steps. Step S**960**: If it is detected that the cleaning device is turning around, close the anti-regurgitation door of the cleaning device, and open the anti-regurgitation door after a turning around action is completed. In this way, the debris is prevented from being regurgitated during a process in which the cleaning device is turning around. Step S**961**: If it is detected that the cleaning device is moving backward, close the anti-regurgitation door of the cleaning device, and open the anti-regurgitation door after a moving backward action is completed. In this way, the debris is prevented from being regurgitated during a process in which the cleaning device is moving backward. The anti-regurgitation door is opened after the moving backward action is completed for preset duration, for example, 2 seconds, to prevent the cleaning device from regurgitating the debris due to moving backward inertia. It should be noted that step S**960** and step S**961** are parallel steps, and there is no sequential relationship or causal relationship. In some embodiments, the method for preventing the cleaning device from regurgitating debris may be included in an optional control mode of the cleaning device for the user to choose. If the user chooses the optional control mode, the cleaning device performs the method to prevent debris from being regurgitated during turning around and/or moving backward. If the user does not choose the optional control mode, the cleaning device only turns around and/or moves backward. This improves intelligence of the cleaning device.

[0317] The present disclosure further provides a control method for a cleaning device. The control

method for the cleaning device includes the following steps. Step S**970**: Determine whether a current edge distance between the cleaning device and a side wall of a target region is a first preset edge distance. The cleaning device is provided with an underwater edge sensor or a water surface edge sensor. The edge sensor may be an ultrasonic sensor or an infrared sensor, and is configured to detect the current edge distance between the cleaning device and the side wall of the target region. The preset edge distance is a preset value. The current edge distance is compared with the preset edge distance, so that the first auxiliary cleaning assembly is controlled to operate. In an embodiment, the edge sensor is provided at a right side of the cleaning device body. Step S**971**: If the current edge distance is the first preset edge distance, control the first auxiliary cleaning assembly of the cleaning device to operate and clean the target side wall. The first auxiliary cleaning assembly can clean the target side wall. Step S**972**: Identify an obstacle and detect an angle between the cleaning device and the obstacle. The cleaning device is provided with an underwater distance measurement sensor or a water surface distance measurement sensor, such as an ultrasonic sensor or an infrared sensor. The distance measurement sensor can detect an attitude of the cleaning device and detect whether there is an obstacle in front of the cleaning device. When the cleaning device moves along the edge, the distance measurement sensor can detect whether there is an obstacle in front of the cleaning device and whether the cleaning device inclines toward the side wall of the target region. There may be one, two, or a plurality of distance measurement sensors. In this embodiment, there are two distance measurement sensors disposed at the left side and the right side of the front end of the cleaning device respectively. Step S**973**: Control an action of the cleaning device based on different types of obstacles. The action includes at least one of moving backward, rotating, and moving forward. The control method for the cleaning device further includes step S**974**. Step S**974**: When it is detected that the current edge distance between the cleaning device and the side wall of the target region is less than a second preset edge distance, the cleaning device stops moving. Based on the above steps, different types of obstacles can be identified, and different actions can be performed based on the different types of obstacles.

[0318] The present disclosure provides a cleaning device, including: a cleaning device body, including an outer side portion; at least one accommodating opening and at least one accommodating groove, where the at least one accommodating opening is provided at the outer side portion, the at least one accommodating groove is provided on the cleaning device body, and the at least one accommodating opening communicates with the at least one accommodating groove; an adjustment mechanism, including at least one buoyancy cavity, where the at least one buoyancy cavity is provided at the cleaning device body and configured to adjust the cleaning device body to be at least partially located on a water surface; a moving mechanism, disposed on the cleaning device body and configured to drive the cleaning device body to move; a main cleaning mechanism, including at least one filtering box, where the at least one filtering box is at least provided with a debris inlet, at least partially accommodated in the at least one accommodating groove, and capable of being assembled to the at least one accommodating groove in a pull-out manner through the at least one accommodating opening, and a direction of pulling out the at least one filtering box includes a direction substantially parallel to a forward direction of the cleaning device; a handle, disposed at a periphery of the at least one filtering box; a roller brush, rotatably disposed at the debris inlet, where the handle and the roller brush are located on a same side of the cleaning device body; and a solar mechanism, including a solar panel disposed on a top surface of the cleaning device body. A maximum length of a contour of the cleaning device body along the forward direction is a first length. A maximum width of the contour of the cleaning device body along a direction perpendicular to the forward direction is a first width. A maximum length of the solar panel along the forward direction is a second length. A maximum width of the solar panel along the direction perpendicular to the forward direction is a second width. A ratio of the second length to the first length is greater than or equal to 0.7 and less than 1. A ratio of the second width to the first width is greater than or equal to 0.5 and less than 1.

[0319] In some embodiments, the cleaning device includes an auxiliary cleaning mechanism, which is different from the roller brush, disposed at the cleaning device body, and at least configured to increase a cleaning range of the debris inlet.
[0320] In some embodiments, the cleaning device includes a locking mechanism disposed between the at least one filtering box and the cleaning device body. When the at least one filtering box is assembled to the at least one accommodating groove through the at least one accommodating opening, the locking mechanism is in a locked state. When the at least one filtering box needs to be removed from the at least one accommodating groove, the locking mechanism is in an unlocked state. The locking mechanism includes a locking assembly and a locking groove, one of the at least one filtering box and the cleaning device body is provided with the locking assembly, and the other one of the at least one filtering box and the cleaning device body is provided with the locking groove.
[0321] In some embodiments, along a height direction of the cleaning device body, a projection of the solar panel overlaps with a projection of the at least one filtering box, and the solar panel is fixedly disposed at the cleaning device body.
[0322] In some embodiments, the auxiliary cleaning mechanism includes a first auxiliary cleaning assembly, and along a height direction of the cleaning device body, a projection of the first auxiliary cleaning assembly at least partially overlaps with a projection of the debris inlet.
[0323] In some embodiments, along the forward direction of the cleaning device, at least a part of the first auxiliary cleaning assembly is disposed in front of the debris inlet, to guide debris outside a working region of the debris inlet to the working region of the debris inlet.
[0324] In some embodiments, one portion of the debris inlet is located on the water surface, the other portion of the debris inlet is located under the water surface, and at least a part of the first auxiliary cleaning assembly is located on the water surface.
[0325] In some embodiments, the first auxiliary cleaning assembly includes a side brush and a rotation shaft, the side brush rotates around the rotation shaft, the rotation shaft is rotatably disposed at the cleaning device body, the side brush includes a side brush body and a cleaning portion, and at least a part of the cleaning portion protrudes from the contour of the cleaning device body.
[0326] In some embodiments, the cleaning device further includes at least one guiding wheel, rotatably disposed at the cleaning device body. The at least one guiding wheel and the first auxiliary cleaning assembly are arranged substantially vertically. A distance over which the at least one guiding wheel protrudes from the contour of the cleaning device body is less than or equal to a distance over which the first auxiliary cleaning assembly protrudes from the contour of the cleaning device body.
[0327] In some embodiments, the at least one filtering box includes a filtering box portion and a rotating portion, the rotating portion has an open position and a closed position relative to the filtering box portion, and when the rotating portion is in the open position, a debris dumping opening is formed on the at least one filtering box, and the debris dumping opening is disposed opposite to the debris inlet.
[0328] In some embodiments, the main cleaning mechanism includes an anti-regurgitation assembly disposed close to the debris inlet of the at least one filtering box, and the anti-regurgitation assembly is configured to prevent at least a part of debris from being regurgitated to a to-be-cleaned region through the debris inlet.
[0329] In some embodiments, a movement track of the roller brush and a movement track of the anti-regurgitation assembly do not interfere with each other, or the movement track of the roller brush and the movement track of the anti-regurgitation assembly interfere with each other, and the anti-regurgitation assembly or the roller brush is made of a flexible material.
[0330] In some embodiments, the adjustment mechanism includes at least a first buoyancy cavity and a second buoyancy cavity substantially symmetrically provided at two sides of the cleaning

device body; and the cleaning device further includes a top cover fixedly disposed between the first buoyancy cavity and the second buoyancy cavity, and the solar panel at least partially covers the top cover.

[0331] In some embodiments, the cleaning device further includes a water quality treatment assembly, and the water quality treatment assembly includes at least a reagent kit configured to treat water quality in a to-be-cleaned region.

[0332] In some embodiments, the cleaning device further includes an anti-stranding assembly, disposed at a bottom of the cleaning device and capable of being switched between a first state and a second state.

[0333] In some embodiments, when the at least one filtering box is assembled to the at least one accommodating groove, the at least one filtering box forms a water discharge channel with a rear portion of the cleaning device body, and at least a part of water discharged from the at least one filtering box is discharged through the water discharge channel along the forward direction of the cleaning device.

[0334] In some embodiments, along the forward direction of the cleaning device, a projection range of the moving mechanism at least partially overlaps with a projection range of the at least one filtering box, and the at least one filtering box is in front of the moving mechanism; or along the direction perpendicular to the forward direction of the cleaning device, the projection range of the moving mechanism at least partially overlaps with a projection range of a rear portion of the at least one filtering box.

[0335] In some embodiments, the anti-regurgitation assembly includes an anti-regurgitation door and an anti-regurgitation drive assembly. The anti-regurgitation door is driven by the anti-regurgitation drive assembly. The anti-regurgitation drive assembly includes a first anti-jamming structure configured to prevent a foreign object from entering the anti-regurgitation drive assembly. The first anti-jamming structure is disposed in at least one of the following manners: the first anti-jamming structure is disposed on the at least one filtering box, the first anti-jamming structure is disposed in the at least one accommodating groove, or the first anti-jamming structure is partially disposed on the at least one filtering box and partially disposed in the at least one accommodating groove.

[0336] In some embodiments, the cleaning device further includes a roller brush drive assembly. The roller brush is driven by the roller brush drive assembly. The roller brush drive assembly includes a second anti-jamming structure configured to prevent a foreign object from entering the roller brush drive assembly. The second anti-jamming structure is disposed in at least one of the following manners: the second anti-jamming structure is disposed on the at least one filtering box, the second anti-jamming structure is disposed in the at least one accommodating groove, or the second anti-jamming structure is partially disposed on the at least one filtering box and partially disposed in the at least one accommodating groove.

[0337] In some embodiments, the cleaning device further includes a light-emitting structure configured to indicate a current state of the cleaning device or improve visibility of the cleaning device in low visibility. The light-emitting structure includes at least one light-emitting part and at least one light transmission part configured to transmit, to the outside of the cleaning device body, light emitted by the at least one light-emitting part. The light-emitting structure further includes at least one light guiding part configured to guide, to a position at which the at least one light transmission part is located, the light emitted by the at least one light-emitting part.

[0338] The above description describes only implementations of the present disclosure and is not intended to limit the scope of the present disclosure. Any equivalent structure or equivalent process transformation performed based on the contents of the specification and the accompanying drawings of the present disclosure or applied directly or indirectly in other related technical fields shall fall within the protection scope of the present disclosure.

Claims

1. A cleaning device, comprising: a cleaning device body, comprising an outer side portion; at least one accommodating opening and at least one accommodating groove, wherein the at least one accommodating opening is provided at the outer side portion, the at least one accommodating groove is provided on the cleaning device body, and the at least one accommodating opening communicates with the at least one accommodating groove; an adjustment mechanism, comprising at least one buoyancy cavity, wherein the at least one buoyancy cavity is provided at the cleaning device body and configured to adjust the cleaning device body to be at least partially located on a water surface; a moving mechanism, disposed on the cleaning device body and configured to drive the cleaning device body to move; a main cleaning mechanism, comprising at least one filtering box, wherein the at least one filtering box is at least provided with a debris inlet, at least partially accommodated in the at least one accommodating groove, and capable of being assembled to the at least one accommodating groove in a pull-out manner through the at least one accommodating opening, and a direction of pulling out the at least one filtering box comprises a direction substantially parallel to a forward direction of the cleaning device; a handle, disposed at a periphery of the at least one filtering box; a roller brush, rotatably disposed at the debris inlet, wherein the handle and the roller brush are located on a same side of the cleaning device body; and a solar mechanism, comprising a solar panel disposed on a top surface of the cleaning device body, wherein a maximum length of a contour of the cleaning device body along the forward direction is a first length, a maximum width of the contour of the cleaning device body along a direction perpendicular to the forward direction is a first width, a maximum length of the solar panel along the forward direction is a second length, a maximum width of the solar panel along the direction perpendicular to the forward direction is a second width, a ratio of the second length to the first length is greater than or equal to 0.7 and less than 1, and a ratio of the second width to the first width is greater than or equal to 0.5 and less than 1.

2. The cleaning device according to claim 1, wherein the cleaning device comprises an auxiliary cleaning mechanism, which is different from the roller brush, disposed at the cleaning device body, and at least configured to increase a cleaning range of the debris inlet.

3. The cleaning device according to claim 1, wherein the cleaning device comprises a locking mechanism disposed between the at least one filtering box and the cleaning device body; when the at least one filtering box is assembled to the at least one accommodating groove through the at least one accommodating opening, the locking mechanism is in a locked state, and when the at least one filtering box needs to be removed from the at least one accommodating groove, the locking mechanism is in an unlocked state; and the locking mechanism comprises a locking assembly and a locking groove, one of the at least one filtering box and the cleaning device body is provided with the locking assembly, and the other one of the at least one filtering box and the cleaning device body is provided with the locking groove.

4. The cleaning device according to claim 1, along a height direction of the cleaning device body, a projection range of the solar panel is equal to or greater than a projection range of the at least one filtering box, and the solar panel is fixedly disposed at the cleaning device body.

5. The cleaning device according to claim 2, wherein the auxiliary cleaning mechanism comprises a first auxiliary cleaning assembly, and along a height direction of the cleaning device body, a projection of the first auxiliary cleaning assembly at least partially overlaps with a projection of the debris inlet.

6. The cleaning device according to claim 5, wherein along the forward direction of the cleaning device, at least a part of the first auxiliary cleaning assembly is disposed in front of the debris inlet, to guide debris outside a working region of the debris inlet to the working region of the debris inlet.

7. The cleaning device according to claim 5, wherein one portion of the debris inlet is located on

the water surface, the other portion of the debris inlet is located under the water surface, and at least a part of the first auxiliary cleaning assembly is located on the water surface.

8. The cleaning device according to claim 5, wherein the first auxiliary cleaning assembly comprises a side brush and a rotation shaft, the side brush rotates around the rotation shaft, the rotation shaft is rotatably disposed at the cleaning device body, the side brush comprises a side brush body and a cleaning portion, and at least a part of the cleaning portion protrudes from the contour of the cleaning device body.

9. The cleaning device according to claim 5, further comprising at least one guiding wheel, rotatably disposed at the cleaning device body, wherein the at least one guiding wheel and the first auxiliary cleaning assembly are arranged substantially vertically, and a distance over which the at least one guiding wheel protrudes from the contour of the cleaning device body is less than or equal to a distance over which the first auxiliary cleaning assembly protrudes from the contour of the cleaning device body.

10. The cleaning device according to claim 1, wherein the at least one filtering box comprises a filtering box portion and a rotating portion, the rotating portion has an open position and a closed position relative to the filtering box portion, and when the rotating portion is in the open position, a debris dumping opening is formed on the at least one filtering box, and the debris dumping opening is disposed opposite to the debris inlet.

11. The cleaning device according to claim 1, wherein the main cleaning mechanism comprises an anti-regurgitation assembly disposed close to the debris inlet of the at least one filtering box, and the anti-regurgitation assembly is configured to prevent at least a part of debris from being regurgitated to a to-be-cleaned region through the debris inlet.

12. The cleaning device according to claim 11, wherein a movement track of the roller brush and a movement track of the anti-regurgitation assembly do not interfere with each other, or the movement track of the roller brush and the movement track of the anti-regurgitation assembly interfere with each other, and the anti-regurgitation assembly or the roller brush is made of a flexible material.

13. The cleaning device according to claim 1, wherein the adjustment mechanism comprises at least a first buoyancy cavity and a second buoyancy cavity substantially symmetrically provided at two sides of the cleaning device body, the cleaning device further comprises a top cover fixedly disposed between the first buoyancy cavity and the second buoyancy cavity, and the solar panel at least partially covers the top cover.

14. The cleaning device according to claim 1, further comprising a water quality treatment assembly, wherein the water quality treatment assembly comprises at least a reagent kit configured to treat water quality of a to-be-cleaned region.

15. The cleaning device according to claim 1, further comprising an anti-stranding assembly, disposed at a bottom of the cleaning device and capable of being switched between a first state and a second state.

16. The cleaning device according to claim 1, wherein when the at least one filtering box is assembled to the at least one accommodating groove, the at least one filtering box forms a water discharge channel with a rear portion of the cleaning device body, and at least a part of water discharged from the at least one filtering box is discharged through the water discharge channel along the forward direction of the cleaning device.

17. The cleaning device according to claim 1, wherein along the forward direction of the cleaning device, a projection range of the moving mechanism at least partially overlaps with a projection range of the at least one filtering box, and the at least one filtering box is in front of the moving mechanism; or along the direction perpendicular to the forward direction of the cleaning device, the projection range of the moving mechanism at least partially overlaps with a projection range of a rear portion of the at least one filtering box.

18. The cleaning device according to claim 11, wherein the anti-regurgitation assembly comprises

an anti-regurgitation door and an anti-regurgitation drive assembly, the anti-regurgitation door is driven by the anti-regurgitation drive assembly, the anti-regurgitation drive assembly comprises a first anti-jamming structure configured to prevent a foreign object from entering the anti-regurgitation drive assembly, and the first anti-jamming structure is disposed in at least one of the following manners: the first anti-jamming structure is disposed on the at least one filtering box, the first anti-jamming structure is disposed in the at least one accommodating groove, or the first anti-jamming structure is partially disposed on the at least one filtering box and partially disposed in the at least one accommodating groove.

19. The cleaning device according to claim 1, further comprising a roller brush drive assembly, wherein the roller brush is driven by the roller brush drive assembly, the roller brush drive assembly comprises a second anti-jamming structure configured to prevent a foreign object from entering the roller brush drive assembly, and the second anti-jamming structure is disposed in at least one of the following manners: the second anti-jamming structure is disposed on the at least one filtering box, the second anti-jamming structure is disposed in the at least one accommodating groove, or the second anti-jamming structure is partially disposed on the at least one filtering box and partially disposed in the at least one accommodating groove.

20. The cleaning device according to claim 1, further comprising a light-emitting structure configured to indicate a current state of the cleaning device or improve visibility of the cleaning device in low visibility, wherein the light-emitting structure comprises at least one light-emitting part and at least one light transmission part configured to transmit, to the outside of the cleaning device body, light emitted by the at least one light-emitting part, and the light-emitting structure further comprises at least one light guiding part configured to guide, to a position at which the at least one light transmission part is located, the light emitted by the at least one light-emitting part.