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(54) **WATER QUALITY MONITORING SYSTEM BASED ON IOT TECHNOLOGY.**

(57) Disclosed is a water quality monitoring system based on an IOT (Internet of Things) technology. The water quality monitoring system comprises a plurality of water quality inspection devices, a cloud platform and a terminal APP; each water quality inspection device comprises a mechanical unit used for collecting a water sample and performing inspection, a single chip microcomputer, a wireless transceiver module and a power supply module; the single chip microcomputer controls the wireless transceiver module to perform data interaction with the cloud platform or a wireless transceiver module of an adjacent water quality inspection device; the cloud platform performs data interaction with the terminal APP; and the single chip microcomputer controls the mechanical unit to work. The present application uses the IOT technology to control the plurality of water quality inspection devices to monitor water quality, which can monitor ammonia nitrogen and a PH value in a river in real time, realize strong timeliness and reduce manual labour intensity.

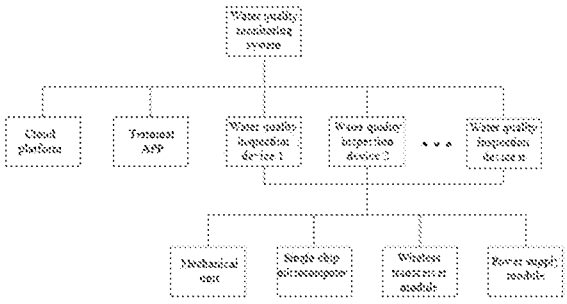

Fig. 1

WATER QUALITY MONITORING SYSTEM BASED ON IOT TECHNOLOGY

Technical Field

The present invention relates to the field of water quality monitoring, in particular to a water quality monitoring system based on an IOT (Internet of Things) technology.

Background

Water quality monitoring is a process of monitoring and measuring types of pollutants in a water body, and concentrations and changing trends of various pollutants, and evaluating water quality. With the rapid increase and expansion of the number and scale of cities, the problem of urban domestic sewage is becoming more and more serious. From the perspective of a sewage discharge structure in China, the discharge amount of residential sewage has exceeded that of industrial sewage for the first time in 1999. The proportion of residential sewage has remained the first place in China's urban sewage discharge for more than ten years since then, while its proportion has been increasing year by year.

Pollutants contained in domestic sewage are mainly organic matters (such as ammonia nitrogen); and meanwhile, the domestic sewage will also change the pH of a water body. Therefore, monitoring ammonia nitrogen and pH in water can effectively monitor the water quality environment in a river. In an existing monitoring process, manual sampling and testing are often carried out, which leads to low timeliness and high manual labour intensity.

Summary

The purpose of the present invention is to provide a water quality monitoring system based on an IOT (Internet of Things) technology, which can be used for monitoring water quality of rivers.

The purpose of the present invention is realized by the technical solution that the water quality monitoring system comprises a plurality of water quality inspection devices, a cloud platform and a terminal APP;

Each water quality inspection device comprises a mechanical unit used for collecting a water sample and performing inspection, a single chip microcomputer, a wireless transceiver module and a power supply module;

The single chip microcomputer controls the wireless transceiver module to perform data interaction with the cloud platform or a wireless transceiver module of an adjacent water quality inspection device; the cloud platform performs data interaction with the terminal APP; and the single chip microcomputer controls the mechanical unit to work.

Further, the mechanical unit comprises a floating platform; a sampling mechanism used for collecting a water sample is installed at the bottom of the floating platform; a detection mechanism used for detecting the collected water sample is installed in the floating platform;

and a water outlet end of the sampling mechanism is connected with a water inlet end of the detection mechanism;

The detection mechanism comprises a first detection assembly and a second detection assembly which are respectively used for detecting ammonia nitrogen and a PH value of the water sample; and the sampling mechanism drives the first detection assembly and the second detection assembly to switch in sequence during sampling, so that the first detection assembly and the second detection assembly are connected with the water outlet end of the sampling mechanism in sequence.

Further, the sampling mechanism comprises a first motor, a piston cylinder, a piston plate, a first one-way valve, a second one-way valve, a threaded sleeve, a first water pipe, a screw rod, a strip-shaped limiting block and a strip-shaped limiting chute;

The piston cylinder is installed at a bottom of the floating platform; the piston plate slides along the inner wall of the piston cylinder; the bottom of the piston cylinder is provided with the first one-way valve; the side wall of the piston cylinder is provided with the second one-way valve; the second one-way valve is connected with a water inlet end of the first water pipe; and the first water pipe extends into the floating platform and is connected with the water inlet end of the detection unit;

The first motor is installed on the floating platform; a power output shaft of the first motor is fixedly connected with the top end of the screw rod; the screw rod is in threaded connection with the threaded sleeve; the threaded sleeve runs through the floating platform; and the bottom end of the threaded sleeve is fixedly connected with the piston plate;

The side wall of the threaded sleeve is provided with the strip-shaped limiting block; and the floating platform is internally provided with the strip-shaped limiting chute which is in sliding fit with the strip-shaped limiting block.

Further, the water sample detection mechanism comprises a first cylinder body, a circular rotating plate, water flow grooves, a first liquid storage tank, a first image collector, a second liquid storage tank, a second image collector, a water storage cylinder, a first rotating shaft, an installation plate, a first driving assembly and a second driving assembly;

The first cylinder body is installed in the floating platform; the circular rotating plate is rotatably arranged on the first cylinder body; and two water flow grooves distributed at 180° along the circle of the circular rotating plate are formed on the circular rotating plate;

Both the first detection assembly and the second detection assembly comprise water sample storage modules; the two water sample storage modules are respectively installed in the two water flow grooves; the first detection assembly further comprises the first liquid storage tank installed on a top plate of the floating platform and used for storing an ammonia nitrogen detection liquid and the first image collector used for collecting a colour change of an ammonia nitrogen detection water sample; the second detection assembly further comprises the second liquid storage tank installed on the top plate of the floating platform and used for storing a PH

reagent and the second image collector used for collecting a colour change of a PH detection water sample; and liquid outlets of the first liquid storage tank and the second liquid storage tank are both provided with electromagnetic valves used for controlling flow rates;

Each water sample storage module comprises the water storage cylinder; the side wall of the water storage cylinder is fixedly connected with the first rotating shaft; the first rotating shaft is rotatably installed on the installation plate; the bottom ends of the installation plates are all installed in the water flow grooves; and a water outlet end of the first water pipe is located above the water storage cylinder near the circle centre of the circular rotating plate;

The water sample detection assembly further comprises the first driving assembly installed in the floating platform to drive the circular rotating plate to rotate, and the second driving assembly is installed on the side wall of the first cylinder body to drive the water storage cylinder to rotate around the first rotating shaft.

Further, the first driving assembly comprises a rack plate, a gear, a ratchet, a second rotating shaft, a third rotating shaft, a first bevel gear, a fourth rotating shaft, a second bevel gear and a transmission piece;

The rack plate is installed on the side wall of the threaded sleeve; the rack plate is meshed with the gear for transmission; the gear is installed on the outer wall of the ratchet; the ratchet is installed on the second rotating shaft; and the second rotating shaft is rotatably installed on the outer wall of the first cylinder body;

The bottom end of the third rotating shaft is installed at the bottom of the first cylinder body; the top end of the third rotating shaft is fixedly connected at the circle centre of the lower surface of the circular rotating plate; the first bevel gear is further installed on the third rotating shaft; one end of the fourth rotating shaft is rotatably installed on the inner wall of the first cylinder body; and the other end of the fourth rotating shaft is provided with the second bevel gear, which is meshed with the first bevel gear for transmission;

The fourth rotating shaft is arranged in parallel with the second rotating shaft; and the second rotating shaft drives the fourth rotating shaft through the transmission piece.

Further, the second driving module comprises a installation block, guide rods, a top block, a first slotting tool, springs, a second slotting tool and guide inclined planes;

The installation block is installed on the side wall of the first cylinder body; more than two sliding holes are arranged on the installation block; the guide rods are in sliding fit with the sliding holes; one end of each guide rod close to the circular rotating plate is fixedly connected to the top block; the other ends of the guide rods are located on the first slotting tool; and the springs are sleeved on the guide rods between the first slotting tool and the installation block;

The side wall of the threaded sleeve is further provided with the second slotting tool which is matched with the first slotting tool and used for driving the top block to slide; the water storage cylinder is driven to rotate around the first rotating shaft during a sliding process of the top block; and the upper and lower ends of a side of the first slotting tool near the second

slotting tool and a side of the second slotting tool near the first slotting tool are provided with the guide inclined planes.

Further, the power supply module comprises a storage battery installed in the floating platform and a photovoltaic assembly installed on the floating platform for charging the storage battery.

Further, both sides of the installation block are provided with water collecting tanks which are connected with a water inlet end of a second water pipe; and a water outlet end of the second water pipe runs through the bottom of the floating platform.

Through use of the technical solution, the present invention has the following advantages:

1. The present application uses the IOT technology to control the plurality of water quality inspection devices so as to monitor water quality, which can monitor ammonia nitrogen and a PH value in a river in real time, with strong timeliness and reduced manual labour intensity.

2. When the threaded sleeve of the present application slides upward, the threaded sleeve drives the piston plate to suck in water; and the first driving module drives the circular rotating plate to rotate, so that the two water sample storage modules on the circular rotating plate switch positions. Meanwhile, in the ascending process, the second driving assembly drives the water storage cylinder to rotate around the first rotating shaft; and the water sample detected last time is poured out.

3. When the threaded sleeve of the present application slides downward, the threaded sleeve drives the piston plate to press the water sample in the piston cylinder into the water storage cylinder; and meanwhile, the threaded sleeve drives the water storage cylinder to rotate around the first rotating shaft through the second driving assembly in the downward moving process, so as to pour out the water sample pressed in the previous stage, thereby realizing cleaning of the inner wall of the water storage cylinder, avoiding an influence of the last detection on the current detection, and realizing high detection accuracy. In addition, when the water storage cylinder rotates, the water sample flowing from the water outlet pipe cleans the outer wall of the water storage cylinder to keep the pipe wall dry, thereby facilitating sampling of image collecting assemblies.

Other advantages, objectives and features of the present invention are elaborated in the subsequent description to some extent, and are apparent to those skilled in the art based on the investigation and research of the following text to some extent, or can be taught from the practice of the present invention. The objectives and other advantages of the present invention can be achieved and obtained by the following description and claims.

Description of Drawings

Description of drawings of the present invention is as follows.

Fig. 1 is a structural schematic diagram of a water quality monitoring system of the present invention;

Fig. 2 is a structural schematic diagram of a water quality inspection device of the present invention;

Fig. 3 is a sectional view of a water quality inspection device of the present invention;

Fig. 4 is a schematic diagram of an internal structure of a floating platform of the present invention;

Fig. 5 is a partial enlarged view of position A in Fig. 4 of the present invention;

Fig. 6 is a schematic diagram of an internal structure of a first cylinder body of the present invention; and

Fig. 7 is a structural schematic diagram of a ratchet of the present invention.

In the drawings: 1-floating platform; 2-first motor; 3-piston cylinder; 4-piston plate; 5-first one-way valve; 6-second one-way valve; 7-threaded sleeve; 8-first water pipe; 9-screw rod; 10-strip-shaped limiting block; 11-strip-shaped limiting chute; 12-first cylinder body; 13-circular rotating plate; 14-water flow groove; 15- first liquid storage tank; 16-first image collector; 17-second liquid storage tank; 18-second image collector; 19-water storage cylinder; 20-first rotating shaft; 21-installation plate; 22-rack plate; 23-gear; 24-ratchet; 25-second rotating shaft; 26-third rotating shaft; 27-first bevel gear; 28-fourth rotating shaft; 29-second bevel gear; 30-transmission piece; 31-installation block; 32-guide rod; 33-top block; 34-first slotting tool; 35-spring; 36-second slotting tool; 37-guide inclined plane; 38-storage battery; 39-photovoltaic assembly; 40-water collecting tank; and 41-second water pipe.

Detailed Description

The present invention will be further described below in combination with the drawings and the embodiments.

It should be noted in the illustration of the embodiments of the present invention that terms such as “central”, “longitudinal”, “transverse”, “upper”, “lower”, “front”, “rear”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “inner” and “outer” indicate direction or position relationships shown based on the drawings, and are only intended to facilitate the description of the present invention and the simplification of the description rather than to indicate or imply that the indicated device or element must have a specific direction or constructed and operated in a specific direction, and therefore, shall not be understood as a limitation to the present invention. In addition, the terms such as “first”, “second” and “third” are only used for the purpose of description, rather than being understood to indicate or imply relative importance. It should be noted in the illustration of the embodiments of the present invention that, unless otherwise specifically regulated and defined, terms such as “connected”, and “connecting” shall be understood in broad sense, and for example, may refer to fixed connection or detachable connection or integral connection, may refer to mechanical connection or electrical connection, and may refer to direct connection or indirect connection through an intermediate medium. For

those ordinary skilled in the art, the meanings of the above terms in the embodiments of present invention may be understood according to specific conditions.

A water quality monitoring system based on the IOT technology, as shown in Fig. 1-Fig. 7, comprises a plurality of water quality inspection devices, a cloud platform and a terminal APP;

Each water quality inspection device comprises a mechanical unit used for collecting a water sample and performing inspection, a single chip microcomputer, a wireless transceiver module and a power supply module;

The single chip microcomputer controls the wireless transceiver module to perform data interaction with the cloud platform or a wireless transceiver module of an adjacent water quality inspection device; the cloud platform performs data interaction with the terminal APP; and the single chip microcomputer controls the mechanical unit to work.

In the embodiment of the present invention, the plurality of water quality inspection devices are sequentially arranged in a river to be monitored; the IOT technology is used to control the plurality of water quality inspection devices to inspect water quality sampling; and when pollutants inspected by the single water quality inspection device exceed standards, other water quality inspection devices at the upstream of the river are started for water quality inspection, so that a pollution source can be quickly positioned.

As an embodiment of the present invention, the mechanical unit comprises a floating platform 1; a sampling mechanism used for collecting a water sample is installed at the bottom of the floating platform 1; a detection mechanism used for detecting the collected water sample is installed in the floating platform 1; and a water outlet end of the sampling mechanism is connected with a water inlet end of the detection mechanism;

The detection mechanism comprises a first detection assembly and a second detection assembly which are respectively used for detecting ammonia nitrogen and a PH value of the water sample; and the sampling mechanism drives the first detection assembly and the second detection assembly to switch in sequence during sampling, so that the first detection assembly and the second detection assembly are connected with the water outlet end of the sampling mechanism in sequence.

In an example of the present invention, the sampling mechanism collects the water sample to be tested, and sends the water sample to the first detection assembly and the second detection assembly to respectively inspect ammonia nitrogen and the PH value.

As an embodiment of the present invention, the sampling mechanism comprises a first motor 2, a piston cylinder 3, a piston plate 4, a first one-way valve 5, a second one-way valve 6, a threaded sleeve 7, a first water pipe 8, a screw rod 9, a strip-shaped limiting block 10 and a strip-shaped limiting chute 11;

The piston cylinder 3 is installed at a bottom of the floating platform 1; the piston plate 4 slides along the inner wall of the piston cylinder 3; the bottom of the piston cylinder 3 is provided with the first one-way valve 5; the side wall of the piston cylinder 3 is provided with the second one-

way valve 6; the second one-way valve 6 is connected with a water inlet end of the first water pipe 8; and the first water pipe 8 extends into the floating platform and is connected with the water inlet end of the detection unit;

The first motor 2 is installed on the floating platform 1; a power output shaft of the first motor 2 is fixedly connected with the top end of the screw rod 9; the screw rod 9 is in threaded connection with the threaded sleeve 7; the threaded sleeve 7 runs through the floating platform 1; and the bottom end of the threaded sleeve 7 is fixedly connected with the piston plate 4;

The side wall of the threaded sleeve 7 is provided with the strip-shaped limiting block 10; and the floating platform 1 is internally provided with the strip-shaped limiting chute 11 which is in sliding fit with the strip-shaped limiting block 10.

In an example of the present invention, when the first motor 2 rotates forward to drive the threaded sleeve 7 to move downward along the strip-shaped limiting chute 11, the water sample is pressed out of the second one-way valve 6 into the detection mechanism; and when the first motor 2 rotates backward to drive the threaded sleeve 7 to move upward along the strip-shaped limiting chute 11, the water in the river is sucked into the piston cylinder 3 from the first one-way valve 5.

As an embodiment of the present invention, the water sample detection mechanism comprises a first cylinder body 12, a circular rotating plate 13, water flow grooves 14, a first liquid storage tank 15, a first image collector 16, a second liquid storage tank 17, a second image collector 18, a water storage cylinder 19, a first rotating shaft 20, an installation plate 21, a first driving assembly and a second driving assembly;

The first cylinder body 12 is installed in the floating platform 1; the circular rotating plate 13 is rotatably arranged on the first cylinder body 12; and the two water flow grooves 14 distributed at 180° along the circle of the circular rotating plate 13 are formed on the circular rotating plate 13;

Both the first detection assembly and the second detection assembly comprise water sample storage modules; the two water sample storage modules are respectively installed in the two water flow grooves 14; the first detection assembly further comprises the first liquid storage tank 15 installed on a top plate of the floating platform 1 and used for storing an ammonia nitrogen detection liquid and the first image collector 16 used for collecting a colour change of an ammonia nitrogen detection water sample; the second detection assembly further comprises the second liquid storage tank 17 installed on the top plate of the floating platform 1 and used for storing a PH reagent and the second image collector 18 used for collecting a colour change of a PH detection water sample; and liquid outlets of the first liquid storage tank 15 and the second liquid storage tank 17 are both provided with electromagnetic valves used for controlling flow rates;

Each water sample storage module comprises the water storage cylinder 19; the side wall of the water storage cylinder 19 is fixedly connected with the first rotating shaft 20; the first rotating shaft 20 is rotatably installed on the installation plate 21; the bottom ends of the installation plates

21 are all installed in the water flow grooves 14; and a water outlet end of the first water pipe 8 is located above the water storage cylinder 19 near the circle centre of the circular rotating plate 13;

The water sample detection assembly further comprises the first driving assembly installed in the floating platform 1 to drive the circular rotating plate 13 to rotate, and the second driving assembly is installed on the side wall of the first cylinder body 12 to drive the water storage cylinder 19 to rotate around the first rotating shaft 20.

In an example of the present invention, the water storage cylinder 19 is made of a transparent material; the number of the first liquid storage tanks 15 is two; and the first liquid storage tanks are used to store an ammonia nitrogen reagent I and an ammonia nitrogen reagent II respectively. After both water storage cylinders 19 store the detection water sample, the ammonia nitrogen reagent I and the ammonia nitrogen reagent II are added into the water storage cylinder 19 on one side; and a PH reagent is added into the water storage cylinder 19 on the other side. Color changes are collected by the first image collector 16 and the second image collector 18 respectively; the colour changes are transmitted to the cloud platform through a wireless communication module and then compared with a colour card; and then, an ammonia nitrogen content and the PH value are judged.

As an embodiment of the present invention, the first driving assembly comprises a rack plate 22, a gear 23, a ratchet 24, a second rotating shaft 25, a third rotating shaft 26, a first bevel gear 27, a fourth rotating shaft 28, a second bevel gear 29 and a transmission piece 30;

The rack plate 22 is installed on the side wall of the threaded sleeve 7; the rack plate 22 is meshed with the gear 23 for transmission; the gear 23 is installed on the outer wall of the ratchet 24; the ratchet 24 is installed on the second rotating shaft 25; and the second rotating shaft 25 is rotatably installed on the outer wall of the first cylinder body 12;

The bottom end of the third rotating shaft 26 is installed at the bottom of the first cylinder body 12; the top end of the third rotating shaft 26 is fixedly connected at the circle centre of the lower surface of the circular rotating plate 13; the first bevel gear 27 is further installed on the third rotating shaft 26; one end of the fourth rotating shaft 28 is rotatably installed on the inner wall of the first cylinder body 12; the other end of the fourth rotating shaft 28 is provided with the second bevel gear 29; and the second bevel gear 29 is meshed with the first bevel gear 27 for transmission;

The fourth rotating shaft 28 is arranged in parallel with the second rotating shaft 25; and the second rotating shaft 25 drives the fourth rotating shaft 28 through the transmission piece 30.

In an example of the present invention, when the motor 2 drives the threaded sleeve 7 to move upward, the motor 2 drives the piston plate 4 to pump the water sample from the first one-way valve 6 into the piston cylinder 3; meanwhile, the rack plate 22 moves upward to drive the gear 23 to rotate; a locking surface of the ratchet 24 is locked to drive the second rotating shaft 25 to rotate; the second rotating shaft 25 drives the fourth rotating shaft 28 to rotate through the transmission piece 30; the fourth rotating shaft 28 drives the third rotating shaft 26 to rotate

through the bevel gear set; and the third rotating shaft 26 drives the circular rotating plate 13 to rotate by 180°. When the circular rotating plate 13 rotates by 180°, the gear 23 is separated from the rack plate 22; the threaded sleeve 7 continues to move upward; a first slotting tool 34 contacts a second slotting tool 36; a top block 33 drives the water storage cylinder 19 to rotate around the first rotating shaft 20, so as to pour out the water sample detected last time; the threaded sleeve 7 continues to move upward; the first slotting tool 34 is separated from the second slotting tool 36; and the water storage cylinder 19 is reset.

As an embodiment of the present invention, the second driving module comprises a installation block 31, guide rods 32, a top block 33, a first slotting tool 34, springs 35, a second slotting tool 36 and guide inclined planes 37;

The installation block 31 is installed on the side wall of the first cylinder body 12; more than two sliding holes are arranged on the installation block 31; the guide rods 32 are in sliding fit with the sliding holes; one end of each guide rod 32 close to the circular rotating plate 13 is fixedly connected to the top block 33; the other ends of the guide rods 32 are located on the first slotting tool 34; and the springs 35 are sleeved on the guide rods 32 between the first slotting tool 34 and the installation block 31;

The side wall of the threaded sleeve 7 is further provided with the second slotting tool 36 which is matched with the first slotting tool 34 and used for driving the top block 33 to slide; the water storage cylinder 19 is driven to rotate around the first rotating shaft 20 during a sliding process of the top block 33; and the upper and lower ends of a side of the first slotting tool 34 near the second slotting tool 36 and a side of the second slotting tool 36 near the first slotting tool 34 are provided with the guide inclined planes 37.

In an example of the present invention, when the motor 2 drives the threaded sleeve 7 to move downward, the ratchet 24 is in an unlocked state; and the gear 23 cannot drive the circular rotating plate 13 to rotate. When the threaded sleeve 7 moves downward, the threaded sleeve 7 drives the piston plate 4 to press out the water sample from the second one-way valve 6; and the water sample flows into the water storage cylinder 19 through the first pipeline 8. When a certain amount of the water sample is stored in the water storage cylinder 19, the guide inclined plane 37 of the first slotting tool 34 contacts the guide inclined plane 37 of the second slotting tool 36. The first slotting tool 34, the guide rod 32 and the top block 33 are driven to slide to one side close to the water storage cylinder 19. The top block 33 drives the water storage cylinder 19 to rotate around the first rotating shaft 20, thereby pouring out the water sample in the water storage cylinder 19, and cleaning the inner wall of the water storage cylinder 19 to prevent the residual water sample in the last inspection from influencing the current detection. Meanwhile, during rotation of the water storage cylinder 19, the water sample flowing from the first pipeline 8 cleans the outer wall of the pipeline; the threaded sleeve 7 continues to move downward; the first slotting tool 34 is separated from the second slotting tool 36; the water storage cylinder 19 is reset; and

the water sample flowing from the first pipeline 8 again enters the water storage cylinder 19 for detection.

As an embodiment of the present invention, the power supply module comprises a storage battery 38 installed in the floating platform 1 and a photovoltaic assembly 39 installed on the floating platform for charging the storage battery 38.

In an example of the present invention, the photovoltaic assembly 39 is arranged to charge the storage battery 38; and the storage battery 38 supplies power for the water quality inspection devices.

As an embodiment of the present invention, both sides of the installation block 31 are provided with water collecting tanks 40 which are connected with a water inlet end of a second water pipe 41; and a water outlet end of the second water pipe 41 runs through the bottom of the floating platform 1.

In an example of the present invention, the water sample which cleans the inner and outer walls of the water storage cylinder 19 flows into the water collecting tank 40 along the water flow groove 14, and then flows from the water quality inspection devices through the second water pipe 41.

Finally, it should be noted that the above embodiments are only used for describing, rather than limiting the technical solution of the present invention. Although the present invention is described in detail with reference to the above embodiments, those ordinary skilled in the art shall understand that the specific embodiments of the present invention can be amended or equivalently replaced. Any amendment or equivalent replacement made without departing from the spirit and the principle of the present invention shall be covered within the protection scope of claims of the present invention.

CLAIMS

1. A water quality monitoring system based on an IOT (Internet of Things) technology, comprising a plurality of water quality inspection devices, a cloud platform and a terminal APP, wherein
   - each water quality inspection device comprises a mechanical unit used for collecting a water sample and performing inspection, a single chip microcomputer, a wireless transceiver module and a power supply module;
   - the single chip microcomputer controls the wireless transceiver module to perform data interaction with the cloud platform or a wireless transceiver module of an adjacent water quality inspection device;
   - the cloud platform performs data interaction with the terminal APP; and
   - the single chip microcomputer controls the mechanical unit to work.

2. The water quality monitoring system based on the IOT technology according to claim 1, wherein
   - the mechanical unit comprises a floating platform (1);
   - a sampling mechanism used for collecting a water sample is installed at a bottom of the floating platform (1);
   - a detection mechanism used for detecting the collected water sample is installed in the floating platform (1);
   - a water outlet end of the sampling mechanism is connected with a water inlet end of the detection mechanism;
   - the detection mechanism comprises a first detection assembly and a second detection assembly which are respectively used for detecting ammonia nitrogen and a PH value of the water sample; and
   - the sampling mechanism drives the first detection assembly and the second detection assembly to switch in sequence during sampling, so that the first detection assembly and the second detection assembly are connected with the water outlet end of the sampling mechanism in sequence.

3. The water quality monitoring system based on the IOT technology according to claim 2, wherein the sampling mechanism comprises a first motor (2), a piston cylinder (3), a piston plate (4), a first one-way valve (5), a second one-way valve (6), a threaded sleeve (7), a first water pipe (8), a screw rod (9), a strip-shaped limiting block (10) and a strip-shaped limiting chute (11), wherein
   - the piston cylinder (3) is installed at a bottom of the floating platform (1);

- the piston plate (4) slides along an inner wall of the piston cylinder (3);
- a bottom of the piston cylinder (3) is provided with the first one-way valve (5);
- a side wall of the piston cylinder (3) is provided with the second one-way valve (6);
- the second one-way valve (6) is connected with a water inlet end of the first water pipe (8);
- the first water pipe (8) extends into the floating platform and is connected with the water inlet end of the detection unit;
- the first motor (2) is installed on the floating platform (1);
- a power output shaft of the first motor (2) is fixedly connected with the top end of the screw rod (9);
- the screw rod (9) is in threaded connection with the threaded sleeve (7);
- the threaded sleeve (7) runs through the floating platform (1);
- the bottom end of the threaded sleeve (7) is fixedly connected with the piston plate (4);
- the side wall of the threaded sleeve (7) is provided with the strip-shaped limiting block (10); and
- the floating platform (1) is internally provided with the strip-shaped limiting chute (11) which is in sliding fit with the strip-shaped limiting block (10).

4. The water quality monitoring system based on the IOT technology according to claim 3, wherein the water sample detection mechanism comprises a first cylinder body (12), a circular rotating plate (13), water flow grooves (14), a first liquid storage tank (15), a first image collector (16), a second liquid storage tank (17), a second image collector (18), a water storage cylinder (19), a first rotating shaft (20), an installation plate (21), a first driving assembly and a second driving assembly, wherein
   - the first cylinder body (12) is installed in the floating platform (1);
   - the circular rotating plate (13) is rotatably arranged on the first cylinder body (12);
   - two water flow grooves (14) distributed at 180° along a circle of the circular rotating plate (13) are formed on the circular rotating plate (13);
   - both the first detection assembly and the second detection assembly comprise water sample storage modules;
   - the two water sample storage modules are respectively installed in the two water flow grooves (14);
   - the first detection assembly further comprises the first liquid storage tank (15) installed on a top plate of the floating platform (1) and used for storing an ammonia nitrogen detection liquid and the first image collector (16) used for collecting a colour change of an ammonia nitrogen detection water sample;

- the second detection assembly further comprises the second liquid storage tank (17) installed on the top plate of the floating platform (1) and used for storing a PH reagent and the second image collector (18) used for collecting a colour change of a PH detection water sample;
- liquid outlets of the first liquid storage tank (15) and the second liquid storage tank (17) are both provided with electromagnetic valves used for controlling flow rates;
- each water sample storage module comprises the water storage cylinder (19);
- the side wall of the water storage cylinder (19) is fixedly connected with the first rotating shaft (20);
- the first rotating shaft (20) is rotatably installed on the installation plate (21);
- the bottom ends of the installation plates (21) are all installed in the water flow grooves (14);
- a water outlet end of the first water pipe (8) is located above the water storage cylinder (19) near a circle centre of the circular rotating plate (13);
- the water sample detection assembly further comprises the first driving assembly installed in the floating platform (1) to drive the circular rotating plate (13) to rotate, and
- the second driving assembly is installed on the side wall of the first cylinder body (12) to drive the water storage cylinder (19) to rotate around the first rotating shaft (20).

5. The water quality monitoring system based on the IOT technology according to claim 4, wherein the first driving assembly comprises a rack plate (22), a gear (23), a ratchet (24), a second rotating shaft (25), a third rotating shaft (26), a first bevel gear (27), a fourth rotating shaft (28), a second bevel gear (29) and a transmission piece (30), wherein
- the rack plate (22) is installed on the side wall of the threaded sleeve (7);
- the rack plate (22) is meshed with the gear (23) for transmission;
- the gear (23) is installed on the outer wall of the ratchet (24);
- the ratchet (24) is installed on the second rotating shaft (25);
- the second rotating shaft (25) is rotatably installed on the outer wall of the first cylinder body (12);
- the bottom end of the third rotating shaft (26) is installed at the bottom of the first cylinder body (12);
- the top end of the third rotating shaft (26) is fixedly connected at the circle centre of a lower surface of the circular rotating plate (13);
- the first bevel gear (27) is further installed on the third rotating shaft (26);
- one end of the fourth rotating shaft (28) is rotatably installed on the inner wall of the first cylinder body (12);
- the other end of the fourth rotating shaft (28) is provided with the second bevel gear (29);

- the second bevel gear (29) is meshed with the first bevel gear (27) for transmission;
- the fourth rotating shaft (28) is arranged in parallel with the second rotating shaft (25); and
- the second rotating shaft (25) drives the fourth rotating shaft (28) through the transmission piece (30).

6. The water quality monitoring system based on the IOT technology according to claim 1, wherein the second driving module comprises a installation block (31), guide rods (32), a top block (33), a first slotting tool (34), springs (35), a second slotting tool (36) and guide inclined planes (37);
   - the installation block (31) is installed on the side wall of the first cylinder body (12);
   - more than two sliding holes are arranged on the installation block (31);
   - the guide rods (32) are in sliding fit with the sliding holes;
   - one end of each guide rod (32) close to the circular rotating plate (13) is fixedly connected to the top block (33);
   - the other ends of the guide rods (32) are located on the first slotting tool (34);
   - the springs (35) are sleeved on the guide rods (32) between the first slotting tool (34) and the installation block (31);
   - the side wall of the threaded sleeve (7) is further provided with the second slotting tool (36) which is matched with the first slotting tool (34) and used for driving the top block (33) to slide;
   - the water storage cylinder (19) is driven to rotate around the first rotating shaft (20) during a sliding process of the top block (33); and
   - the upper and lower ends of a side of the first slotting tool (34) near the second slotting tool (36) and a side of the second slotting tool (36) near the first slotting tool (34) are provided with the guide inclined planes (37).

7. The water quality monitoring system based on the IOT technology according to claim 1, wherein the power supply module comprises a storage battery (38) installed in the floating platform (1) and a photovoltaic assembly (39) installed on the floating platform for charging the storage battery (38).

8. The water quality monitoring system based on the IOT technology according to claim 6, wherein
   - both sides of the installation block (31) are provided with water collecting tanks (40) which are connected with a water inlet end of a second water pipe (41); and
   - a water outlet end of the second water pipe (41) runs through the bottom of the floating platform (1).

ANSPRÜCHE

1. Wasserqualitätsüberwachungssystem, das auf einer IOT (Internet der Dinge) -Technologie basiert und eine Vielzahl von Wasserqualitätsinspektionsvorrichtungen, eine Cloud-Plattform und eine Endgeräte-APP umfasst, wobei
   - jedes Wasserqualitätsinspektionsgerät eine mechanische Einheit, die zum Sammeln einer Wasserprobe und zur Durchführung einer Inspektion verwendet wird, einen Einzelchip-Mikrocomputer, ein drahtloses Sende-/Empfangsmodul und ein Stromversorgungsmodul umfasst;
   - der Einzelchip-Mikrocomputer das drahtlose Sende-/Empfangsmodul steuert, um eine Dateninteraktion mit der Cloud-Plattform oder einem drahtlosen Sende-/Empfangsmodul eines benachbarten Wasserqualitätsinspektionsgeräts durchzuführen;
   - die Cloud-Plattform eine Dateninteraktion mit der Terminal-APP durchführt; und
   - der Einzelchip-Mikrocomputer die mechanische Einheit steuert, um zu arbeiten.

2. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 1, wobei
   - die mechanische Einheit eine schwimmende Plattform (1) umfasst;
   - ein Probenentnahmemechanismus, der zum Sammeln einer Wasserprobe verwendet wird, an einem Boden der schwimmenden Plattform (1) installiert ist;
   - ein Erfassungsmechanismus, der zum Erfassen der gesammelten Wasserprobe verwendet wird, in der schwimmenden Plattform (1) installiert ist;
   - ein Wasserauslassende des Probenahmemechanismus mit einem Wassereinlassende des Detektionsmechanismus verbunden ist;
   - der Detektionsmechanismus eine erste Detektionsbaugruppe und eine zweite Detektionsbaugruppe umfasst, die jeweils zum Detektieren von Ammoniak-Stickstoff und eines PH-Wertes der Wasserprobe verwendet werden; und
   - der Probenahmemechanismus die erste Erfassungsbaugruppe und die zweite Erfassungsbaugruppe antreibt, um während der Probenahme nacheinander zu schalten, so dass die erste Erfassungsbaugruppe und die zweite Erfassungsbaugruppe nacheinander mit dem Wasserauslassende des Probenahmemechanismus verbunden werden.

3. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 2, wobei der Probenahmemechanismus einen ersten Motor (2), einen Kolbenzylinder (3), eine Kolbenplatte (4), ein erstes Einwegventil (5), ein zweites Einwegventil (6), eine Gewindehülse (7), ein erstes Wasserrohr (8), eine Schraubstange (9),

einen streifenförmigen Begrenzungsblock (10) und eine streifenförmige Begrenzungsrutsche (11) umfasst, wobei

- der Kolbenzylinder (3) an einem Boden der schwimmenden Plattform (1) installiert ist;
- die Kolbenplatte (4) entlang einer Innenwand des Kolbenzylinders (3) gleitet;
- ein Boden des Kolbenzylinders (3) mit dem ersten Einwegventil (5) versehen ist;
- eine Seitenwand des Kolbenzylinders (3) mit dem zweiten Einwegventil (6) versehen ist;
- das zweite Einwegventil (6) mit einem Wassereinlassende der ersten Wasserleitung (8) verbunden ist;
- die erste Wasserleitung (8) sich in die schwimmende Plattform erstreckt und mit dem Wassereinlassende der Detektionseinheit verbunden ist;
- der erste Motor (2) auf der schwimmenden Plattform (1) installiert ist;
- eine Leistungsabgabewelle des ersten Motors (2) fest mit dem oberen Ende der Schraubenstange (9) verbunden ist;
- die Gewindestange (9) mit der Gewindehülse (7) in Gewindeverbindung ist;
- die Gewindehülse (7) durch die schwimmende Plattform (1) verläuft;
- das untere Ende der Gewindehülse (7) fest mit der Kolbenplatte (4) verbunden ist;
- die Seitenwand der Gewindehülse (7) mit dem streifenförmigen Begrenzungsblock (10) versehen ist; und
- die schwimmende Plattform (1) innen mit der streifenförmigen Begrenzungsrutsche (11) versehen ist, die in Gleitpassung mit dem streifenförmigen Begrenzungsblock (10) ist.

4. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 3, wobei der Wasserprobenerfassungsmechanismus einen ersten Zylinderkörper (12), eine kreisförmige Drehplatte (13), Wasserdurchflussrillen (14), einen ersten Flüssigkeitsspeichertank (15), einen ersten Bildsammler (16), einen zweiten Flüssigkeitsspeichertank (17), einen zweiten Bildsammler (18), einen Wasserspeicherzylinder (19), eine erste Drehwelle (20), eine Installationsplatte (21), eine erste Antriebsanordnung und eine zweite Antriebsanordnung umfasst, wobei

- der erste Zylinderkörper (12) in der schwimmenden Plattform (1) installiert ist;
- der kreisförmige Drehteller (13) drehbar auf dem ersten Zylinderkörper (12) angeordnet ist;
- auf der kreisförmigen Drehplatte (13) zwei um 180° entlang eines Kreises der kreisförmigen Drehplatte (13) verteilte Wasserdurchflussrillen (14) ausgebildet sind;
- sowohl die erste Erfassungsbaugruppe als auch die zweite Erfassungsbaugruppe Wasserprobenspeichermodule umfassen;
- die beiden Wasserprobenspeichermodule jeweils in den beiden Wasserdurchflussrillen (14) installiert sind;

- die erste Erfassungsbaugruppe ferner den ersten Flüssigkeitsspeichertank (15), der auf einer oberen Platte der schwimmenden Plattform (1) installiert ist und zum Speichern einer Ammoniak-Stickstoff-Erfassungsflüssigkeit verwendet wird, und den ersten Bildsammler (16), der zum Sammeln einer Farbänderung einer Ammoniak-Stickstoff-Erfassungswasserprobe verwendet wird, umfasst,
- die zweite Detektionsanordnung ferner den zweiten Flüssigkeitsspeichertank (17), der auf der oberen Platte der schwimmenden Plattform (1) installiert ist und zum Speichern eines PH-Reagens verwendet wird, und den zweiten Bildkollektor (18), der zum Sammeln einer Farbänderung einer PH-Detektionswasserprobe verwendet wird, umfasst;
- die Flüssigkeitsauslässe des ersten Flüssigkeitsvorratsbehälters (15) und des zweiten Flüssigkeitsvorratsbehälters (17) beide mit elektromagnetischen Ventilen versehen sind, die zur Steuerung der Durchflussmengen dienen;
- jedes Wasserprobenspeichermodul den Wasserspeicherzylinder (19) umfasst;
- die Seitenwand des Wasserspeicherzylinders (19) fest mit der ersten Drehwelle (20) verbunden ist;
- die erste rotierende Welle (20) drehbar auf der Installationsplatte (21) installiert ist;
- die unteren Enden der Installationsplatten (21) alle in den Wasserdurchflussrillen (14) installiert sind;
- ein Wasserauslassende der ersten Wasserleitung (8) sich oberhalb des Wasserspeicherzylinders (19) in der Nähe eines Kreismittelpunkts der kreisförmigen Drehplatte (13) befindet;
- die Wasserprobenermittlungsbaugruppe ferner die erste Antriebsbaugruppe umfasst, die in der schwimmenden Plattform (1) installiert ist, um die kreisförmige Drehplatte (13) in Drehung zu versetzen, und
- die zweite Antriebsbaugruppe an der Seitenwand des ersten Zylinderkörpers (12) installiert ist, um den Wasserspeicherzylinder (19) zur Drehung um die erste Drehwelle (20) anzutreiben.

5. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 4, wobei die erste Antriebsbaugruppe eine Zahnstangenplatte (22), ein Zahnrad (23), eine Ratsche (24), eine zweite rotierende Welle (25), eine dritte rotierende Welle (26), ein erstes Kegelrad (27), eine vierte rotierende Welle (28), ein zweites Kegelrad (29) und ein Übertragungsstück (30) umfasst, wobei
   - die Zahnstangenplatte (22) an der Seitenwand der Gewindehülse (7) angebracht ist;
   - die Zahnstangenplatte (22) mit dem Zahnrad (23) zur Übertragung in Eingriff steht;
   - das Zahnrad (23) an der Außenwand der Sperrklinke (24) angebracht ist;
   - die Sperrklinke (24) auf der zweiten Drehwelle (25) angebracht ist;

- die zweite rotierende Welle (25) drehbar an der Außenwand des ersten Zylinderkörpers (12) angebracht ist;
- das untere Ende der dritten Drehwelle (26) am Boden des ersten Zylinderkörpers (12) angebracht ist;
- das obere Ende der dritten Drehwelle (26) fest mit dem Kreismittelpunkt einer unteren Fläche der kreisförmigen Drehplatte (13) verbunden ist;
- das erste Kegelrad (27) außerdem auf der dritten rotierenden Welle (26) installiert ist;
- ein Ende der vierten Drehwelle (28) drehbar an der Innenwand des ersten Zylinderkörpers (12) angebracht ist;
- das andere Ende der vierten rotierenden Welle (28) mit dem zweiten Kegelrad (29) versehen ist;
- das zweite Kegelrad (29) mit dem ersten Kegelrad (27) zur Übertragung in Eingriff steht;
- die vierte rotierende Welle (28) parallel zur zweiten rotierenden Welle (25) angeordnet ist; und
- die zweite rotierende Welle (25) die vierte rotierende Welle (28) durch das Übertragungsstück (30) antreibt.

6. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 1, wobei das zweite Antriebsmodul einen Installationsblock (31), Führungsstangen (32), einen oberen Block (33), ein erstes Schlitzwerkzeug (34), Federn (35), ein zweites Schlitzwerkzeug (36) und schräge Führungsebenen (37) umfasst;
   - der Montageblock (31) an der Seitenwand des ersten Zylinderkörpers (12) angebracht ist;
   - auf dem Montageblock (31) mehr als zwei Gleitlöcher angeordnet sind;
   - die Führungsstangen (32) in Gleitpassung mit den Gleitlöchern sind;
   - ein Ende jeder Führungsstange (32) in der Nähe des kreisförmigen Drehtellers (13) fest mit dem oberen Block (33) verbunden ist;
   - die anderen Enden der Führungsstangen (32) sich auf dem ersten Schlitzwerkzeug (34) befinden;
   - die Federn (35) auf den Führungsstangen (32) zwischen dem ersten Schlitzwerkzeug (34) und dem Installationsblock (31) gelagert sind;
   - die Seitenwand der Gewindehülse (7) außerdem mit dem zweiten Schlitzwerkzeug (36) versehen ist, das auf das erste Schlitzwerkzeug (34) abgestimmt ist und dazu dient, den oberen Block (33) zum Gleiten zu bringen;
   - der Wasserspeicherzylinder (19) angetrieben wird, um sich während eines Gleitvorgangs des oberen Blocks (33) um die erste Drehwelle (20) zu drehen; und
   - die oberen und unteren Enden einer Seite des ersten Schlitzwerkzeugs (34) in der Nähe des zweiten Schlitzwerkzeugs (36) und einer Seite des zweiten Schlitzwerkzeugs (36) in

der Nähe des ersten Schlitzwerkzeugs (34) mit den schrägen Führungsebenen (37) versehen sind. LU502403

7. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 1, wobei das Stromversorgungsmodul eine in der schwimmenden Plattform (1) installierte Speicherbatterie (38) und eine auf der schwimmenden Plattform installierte Photovoltaikbaugruppe (39) zum Laden der Speicherbatterie (38) umfasst.

8. Das auf der IOT-Technologie basierende Wasserqualitätsüberwachungssystem nach Anspruch 6, wobei
   - beide Seiten des Installationsblocks (31) mit Wassersammeltanks (40) versehen sind, die mit einem Wassereinlassende einer zweiten Wasserleitung (41) verbunden sind; und
   - ein Wasserauslassende der zweiten Wasserleitung (41) durch den Boden der schwimmenden Plattform (1) verläuft.

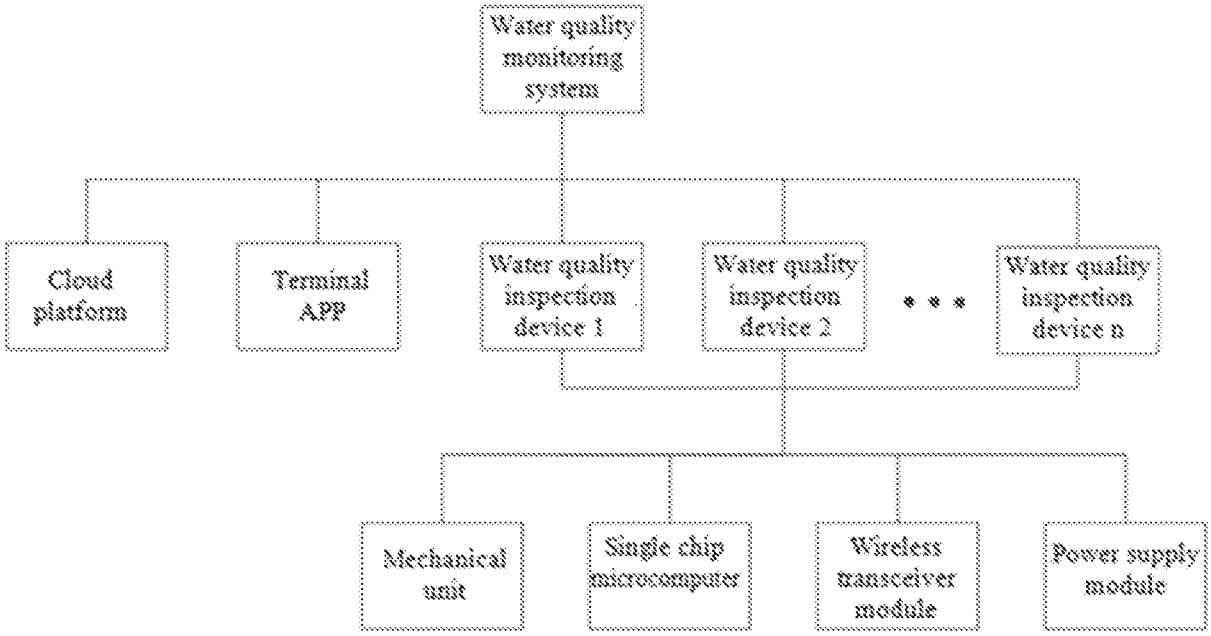
Water quality monitoring system
Cloud platform
Terminal APP
Water quality inspection device 1
Water quality inspection device 2
* * *
Water quality inspection device n
Mechanical unit
Single chip microcomputer
Wireless transceiver module
Power supply module

Fig. 1

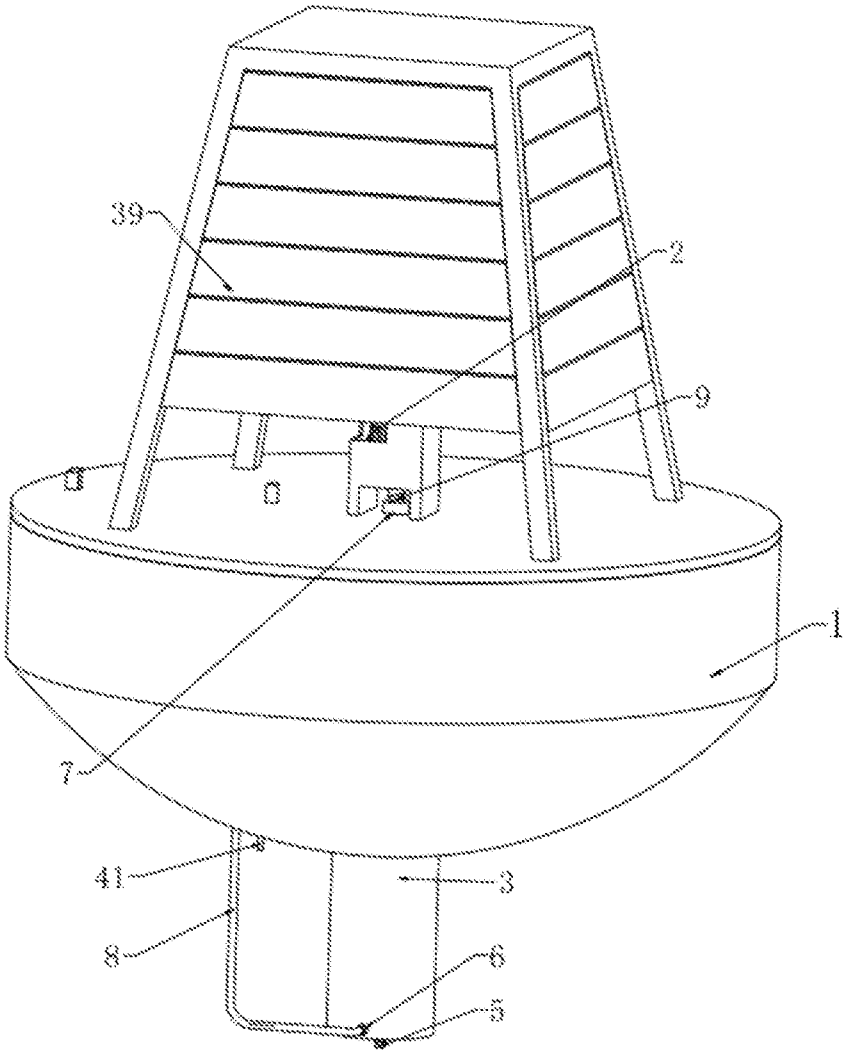
39
2
9
1
7
41
3
8
6
5

Fig. 2

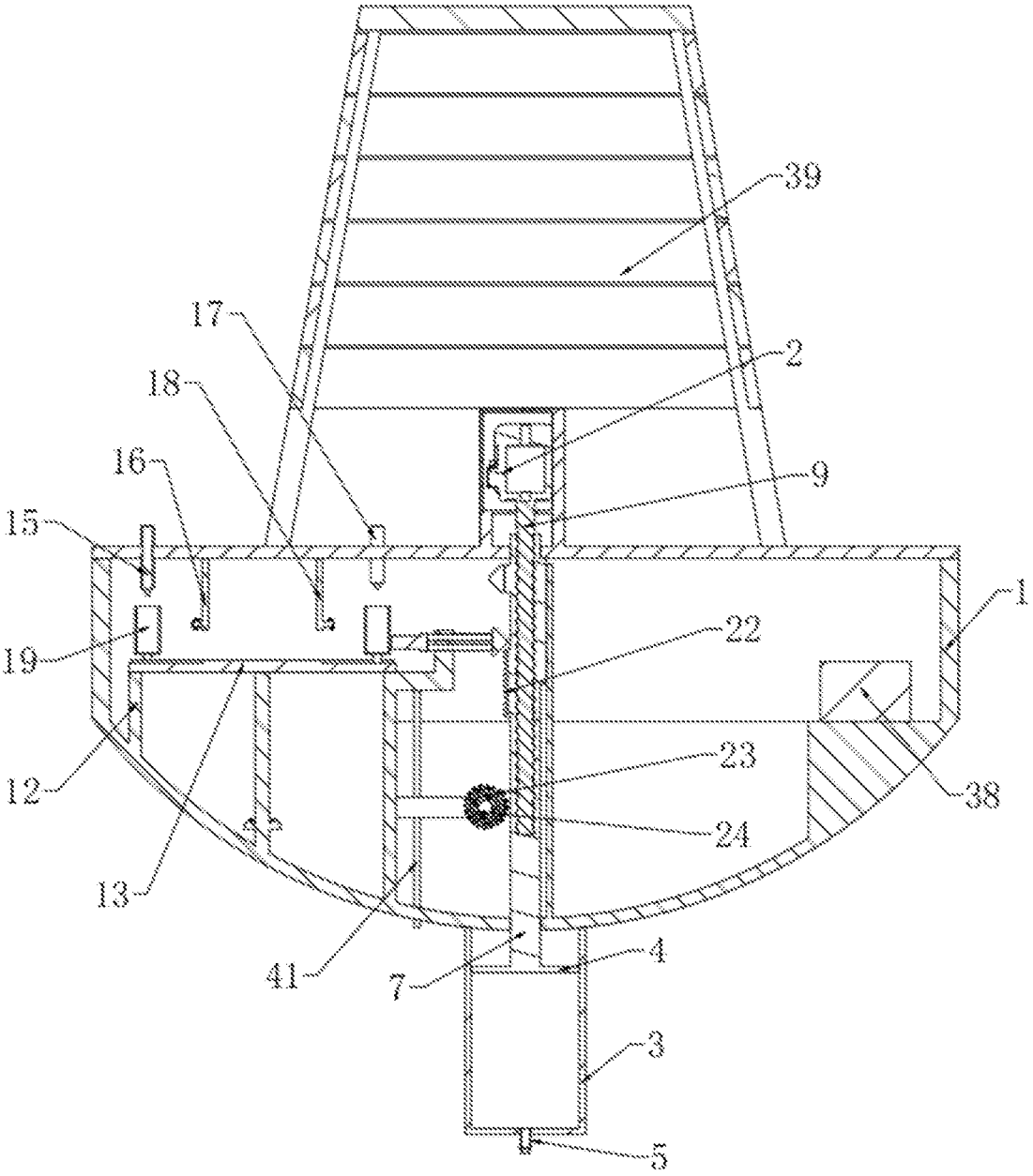

Fig. 3

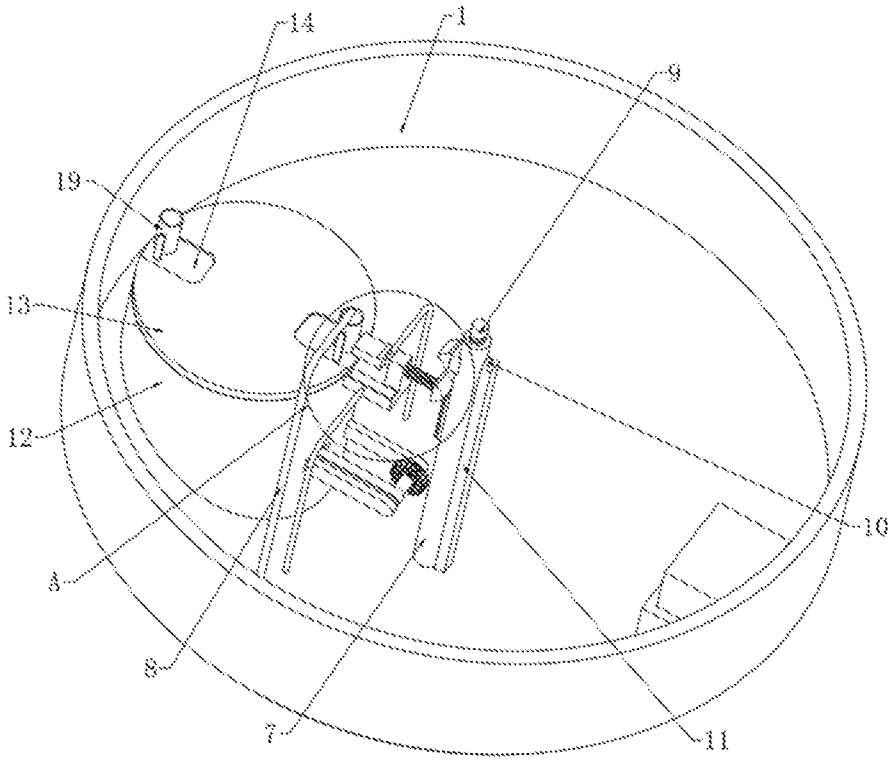

Fig. 4

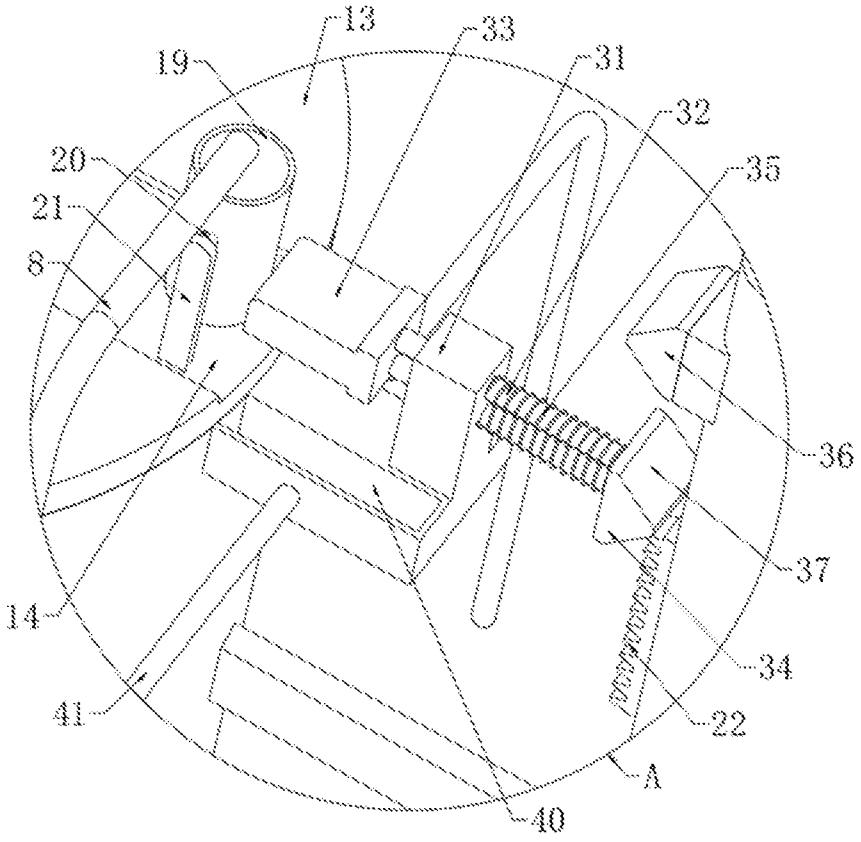

Fig. 5

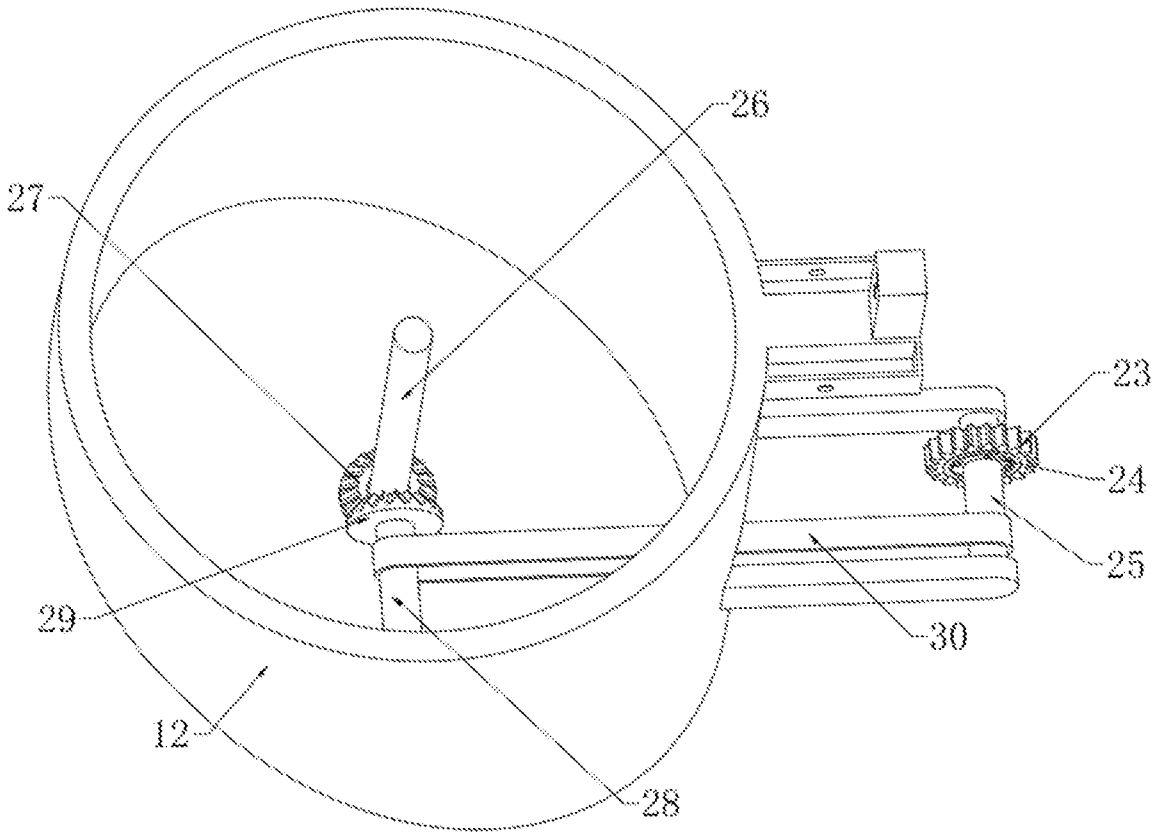

Fig. 6

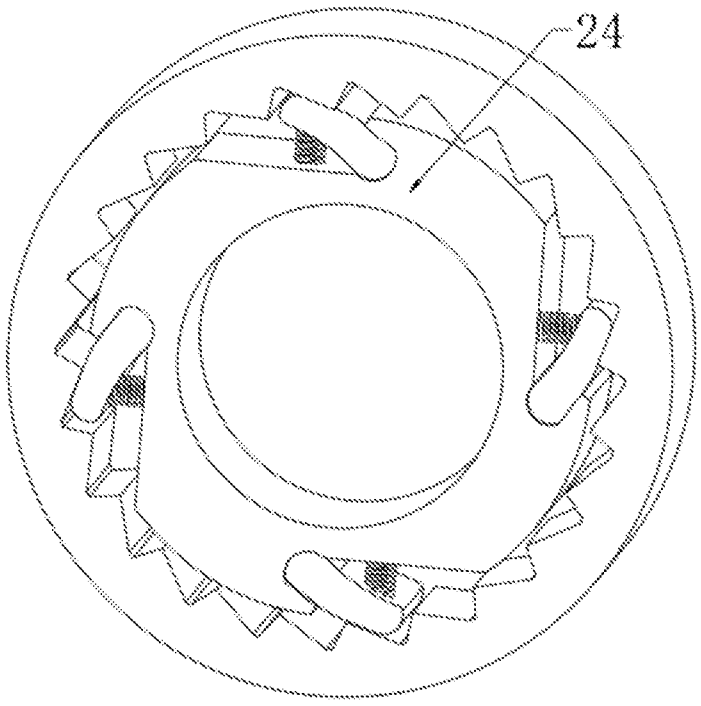

Fig. 7