(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 699 358 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
29.06.2022 Bulletin 2022/26

(21) Application number: **18867968.2**

(22) Date of filing: **25.05.2018**

(51) International Patent Classification (IPC):
E02B 3/12 *(2006.01)* ***E02D 15/10*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E02D 27/52; E02B 3/121; E02B 5/02; E02D 13/06; E02D 15/10

(86) International application number:
PCT/CN2018/088442

(87) International publication number:
WO 2019/076059 (25.04.2019 Gazette 2019/17)

(54) AUTOMATIC PAVER SYSTEM HAVING A MEASURING AND POSITIONING STRUCTURE

AUTOMATISCHES PLATTENLEGESYSTEM MIT MESS- UND POSITIONIERUNGSSTRUKTUR

SYSTÈME FINISSEUR AUTOMATIQUE AYANT UNE STRUCTURE DE MESURE ET DE POSITIONNEMENT

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **18.10.2017 CN 201710976990**

(43) Date of publication of application:
26.08.2020 Bulletin 2020/35

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Description

FIELD

[0001] The present disclosure relates to the technical field of underwater paving, and more particularly relates to an auto-paver system with a measuring and positioning structure.

BACKGROUND

[0002] In a construction method of an immersed tube tunnel, it needs to excavate a base groove at the water bottom first, then tube sections of the tunnel are sunk into the pre-dredged base groove section by section, and the bottom surface of the base groove serving as the foundation of the immersed tube section is uneven after being excavated and formed, and backfilled stone is required to level the bottom surface, so that the bearing capacity of the foundation is improved, and the related settlement is controlled. As such, each tube section of the paved tunnel is uniformly stressed, and the use effect is good.

[0003] In order to improve the smoothness of the bottom surface of the base groove, the operation ship in the existing art generally adopts a floating leveling ship with positioning piles or a platform leveling ship. The floating leveling ship and the platform leveling ship with positioning piles generally include a distributing pipe, the distributing pipe is directly penetrated into the water bottom, as the whole length of the distributing pipe is long, the underwater part of the distributing pipe is easy to be directly influenced by water flows and waves, so that the leveling accuracy is reduced.

[0004] JP-S-6062332 discloses a reference ruler having four or more legs, each of which is extendable and retractable, at a lower portion of a framed frame, and an equalizer mounted on the frame so as to be movable along the reference ruler and having a hopper at an upper portion. A plate for widening the contact area is removed at the lower end of each leg of the reference ruler of the grading mound construction device having a grading stone supply chute and a vibrating compactor connected to one side in the moving direction of the grading stone supply chute. The construction device is hung down on the water floor in a range where an underwater structure or the like in which foundation rubble has been previously placed has been set down, and then the legs of the reference ruler are expanded and contracted to level the construction device. And the leveling chute is adjusted to the desired height, and the leveling chute is leveled from the hopper with the leveling chute along the reference ruler toward the side where the vibrating compactor is connected. Stones are emitted to the bottom of the water. The stone supply chute is moved along the standard ruler in the direction opposite to the side where the vibratory compactor is connected, and the leveling stone is supplied to the water bottom and rolled to form a leveling stone mound.

SUMMARY

[0005] The main purpose of the present disclosure is to provide an auto-paver system with a measuring and positioning structure, which aims to ensure that the present disclosure of the auto-paver system for underwater gravel paving is less affected by water flows and waves and has a high paving precision.

[0006] In order to achieve the above object, the present disclosure provides an auto-paver system with a measuring and positioning structure, which includes a paver, the paver includes:

a support structure supported on the water bottom surface;

a transport structure slidably connected to the support structure; and

a distributing structure connected to the transport structure, and including a feed port and a discharge port through which materials pass, the discharge port being extended towards the water bottom surface, and the transport structure being configured to drive the distributing structure to move on the support structure to lay materials through the discharge port;

the measuring and positioning structure including a measuring frame and at least one positioning structure, one end of the measuring frame being rotatably connected with the support structure, and the positioning structure being fixed to the other end of the measuring frame.

[0007] According to the technical scheme of the present disclosure, the support structure of the auto-paver system is supported on the water bottom surface, the transport structure is slidably connected with the support structure, the support structure provides a support and s guidance for a movement track of the transport structure, so that the transport structure can move relatively close to the water bottom surface. The distributing structure is connected with the transport

structure, so that the distributing structure can also move close to the water bottom surface under the drive of the transport structure, materials are input from a feed port of the distributing structure, and is output by a discharge port which is extended towards the water bottom surface. As the distribution structure is close to the water bottom surface, the materials output by the discharge port can fall to a designated position of the water bottom surface through a short distance, and the whole blanking process is almost not affected by water flows, so that the laying position of the materials on the water bottom surface is accurate.

[0008] Furthermore, the support structure is also provided with a measuring and positioning structure, a positioning structure of the measuring and positioning structure is configured for acquiring self position information of the measuring and positioning structure, position information of the support structure can be obtained by combining a known form of the measuring frame and the self position information, and the support structure can be accurately placed at a designated position according to the obtained position information of the support structure, so that a distributing position of the distributing structure is more accurate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] To better illustrate the technical solutions that are reflected in various embodiments according to this disclosure or that are found in the prior art, the accompanying drawings intended for the description of the embodiments herein or for the prior art will now be briefly described.

Fig. 1 is a structural schematic diagram of an auto-paver system with a measuring and positioning structure according to an embodiment of the present disclosure;
Fig. 2 is an enlarged view at portion A in Fig. 1;
Fig. 3 is similar to Fig. 1, but shown from another view;
Fig. 4 is an enlarged view at portion B in Fig. 3;
Fig. 5 is a structural schematic diagram of a measuring and positioning structure of Fig. 1 in a shutdown state;
Fig. 6 is a structural schematic diagram of an auto-paver system with a measuring and positioning structure according to another embodiment of the present disclosure;
Fig. 7 is a schematic view of a support structure connected to a retraction structure in the auto-paver system of Fig. 1; and
Fig. 8 is a schematic structural view of the support structure in Fig. 1 lifted by the retraction structure.

[0010] Labels illustration for drawings:

Table 1

Label	Name	Label	Name
100	auto-paver system	161	leg
10	paver	162	driving part
11	support structure	163	connecting part
111	guide rail	17	positioning structure
1111	longitudinal guide rail	171	measuring frame
1113	transverse guide rail	1711	upright post
113	support frame	1713	connecting bracket
1131	first crossbeam	1713a	connecting beam
1133	second crossbeam	1713b	reinforcing rod
121	pin shaft	172	second connecting piece
123	bolt	173	positioning structure
13	transport structure	174	fourth connecting piece
141	storage structure	18	buoyancy column
143	suction pipe	182	first connecting piece
145	sludge suction structure	184	third connecting piece

(continued)

Label	Name	Label	Name
1451	sludge suction port	30	workbench
1453	sludge discharge port	31	first workbench
151	blanking hopper	33	second workbench
153	distributing pipe	35	third workbench
155	distributing structure	50	retraction structure
1551	feed port	51	driving piece
1553	discharge port	53	connecting piece
16	measuring positioning structure		

[0011] The realization of the aim, functional characteristics, advantages of the present disclosure are further described specifically with reference to the accompanying drawings and embodiments.

DETAILED DESCRIPTION

[0012] The technical solutions of the embodiments of the present disclosure will be clearly and completely described in the following with reference to the accompanying drawings. It is obvious that the embodiments to be described are only a part rather than all of the embodiments of the present disclosure.

[0013] It is to be understood that, all of the directional instructions in the exemplary embodiments of the present disclosure (such as top, down, left, right, front, back.....) can only be used for explaining relative position relations, moving condition of the elements under a special form (referring to figures), and so on, if the special form changes, the directional instructions changes accordingly.

[0014] In addition, the descriptions, such as the "first", the "second" in the exemplary embodiment of present disclosure, can only be used for describing the aim of description, and cannot be understood as indicating or suggesting relative importance or impliedly indicating the number of the indicated technical character.

[0015] Referring to Figs. 1 to 8, an auto-paver system 100 with a measuring and positioning structure proposed in this present disclosure includes a paver 10 including:

a support structure 11 supported on a water bottom surface;
a transport structure 13 slidably connected to the support structure 11; and
a distributing structure 155 connected to the transport structure 13 and having a feed port 1551 and a discharge port 1553 through which materials pass, the discharge port 1553 is extended towards the water bottom surface, the transport structure 13 is configured to drive the distributing structure 155 to move on the support structure 11, to lay materials through the discharge port 1553; and
the measuring and positioning structure 17 including a measuring frame 171 and at least one positioning structure 173, one end of the measuring frame 171 is rotatably connected to the support structure 11, and the positioning structure 173 is fixed to the other end of the measuring frame 171.

[0016] The support structure 11 of the auto-paver system 100 according to the technical scheme of the present disclosure is supported on the water bottom surface, and the transport structure 13 is slidably connected to the support structure 11. The support structure 11 can limit a movement track of the transport structure 13 and enable the transport structure 13 to move relatively close to the water bottom surface. The distributing structure 155 is connected to the transport structure 13, so that the distributing structure 155 can also move at a position close to the water bottom surface under the drive of the transport structure 13. Materials are input through the feed port 1551 of the distributing structure 155 and output through the discharge port 1553, and the discharge port 1553 is extended towards the water bottom surface. As the distributing structure 155 is close to the water bottom surface, the materials output by the distributing structure 155 can fall to a designated position of the water bottom surface through a short distance, and the whole laying process is hardly influenced by water flows, so that the laying position of the materials on the water bottom surface is accurate.

[0017] Furthermore, the support structure 11 is also provided with a measuring and positioning structure 17. The positioning structure 173 of the measuring and positioning structure 17 is used for acquiring self position information of the measuring and positioning structure 17. Position information of the support structure 11 can be obtained by combing

the self position information with the known form of the measuring frame 171, and the support structure 11 can be accurately placed at a designated position according to the obtained position information of the support structure 11, so that the distributing position of the distributing structure 155 is more accurate.

[0018] The measuring frame 171 is rotatably connected to the support frame 11, so that an overall height of the measuring and positioning structure 17 can be adjusted, thereby achieving the purpose of not occupying the navigation channel.

[0019] Specifically, the measuring frame 171 is configured to rotate relative to the support structure 11 to have a first state and a second state, the positioning structure 173 on the measuring frame 171 in the first state is higher than the positioning structure 173 on the measuring frame 171 in the second state. In the first state, the detection effect of the positioning structure 173 is more accurate, and in the second state, the overall height of the measuring and positioning structure 17 is reduced, so that the paver 10 achieves the purpose of less or no obstruction to the navigation channel.

[0020] In one embodiment of the present disclosure, the measuring frame 171 includes at least one upright post 1711, one end of the upright post 1711 is rotatably connected to the support structure 11, and the positioning structure 173 is fixed to the other end of the upright post 1711.

[0021] The positioning structure 173 supported by the upright post 1711 can be extended by a certain distance, so that the positioning structure 173 is close to the water surface or extended out of the water surface, so that the positioning structure 173 is less interfered by underwater, and the positioning is accurate.

[0022] Referring to Figs. 1 and 2, in one embodiment of the present disclosure, the upright post 1711 is provided with a first connecting piece 172, the first connecting piece 172 is provided with a first connecting hole, the support structure 11 is provided with a second connecting piece 182 matched with the first connecting piece 172, the second connecting piece 182 is provided with a second connecting hole matched with the first connecting hole, and a pin shaft 121 is passed through the first connecting hole and the second connecting hole matched with the first connecting hole to rotatably connect the upright post 1711 and the support structure 11. Under the restriction of the pin shaft 121, the upright post 1711 can rotate relative to the support structure 11, and the rotating structure is simple.

[0023] In one embodiment of the present disclosure, the paver 10 further includes a limiting structure, which is configured to limit and fix the upright post 1711 and the support structure 11 when the upright post 1711 is rotated to form an included angle with the support structure 11.

[0024] Specifically, the upright post 1711 is rotatably connected to a side of the support structure 11 facing away from the water bottom surface. Therefore, the upright post 1711 is rotated only on the side of the support structure 11 facing away from the water bottom surface during the rotation of the support structure 11. The upright post 1711 is rotated to form an included angle with the support structure 11, which is greater than zero, that is, the position where the positioning structure 173 is located is relatively high with respect to the water bottom surface. In this state, the positioning detection effect of the positioning structure 173 is better, that is, the first state is reached. When the angle between the upright post 1711 and the support structure 11 is zero, that is, it is measured that the whole positioning structure 17 is at a lowest position with respect to the water bottom surface. In this state, the paver 10 can be completely accommodated in the base groove to reach the second state without blocking the navigation channel.

[0025] In one embodiment of the present disclosure, the limiting structure includes a third connecting piece 174 arranged on the upright post 1711 and a fourth connecting piece 184 arranged on the support structure 11, the third connecting piece 174 is provided with a third connecting hole, the fourth connecting piece 184 is provided with a fourth connecting hole matched with the third connecting hole, a bolt 123 is detachably passed through the third connecting hole and the fourth connecting hole, to detachably connect the upright post 1711 and the support structure 11, and when the upright post 1711 is rotated to form an included angle with the support structure 11 the bolt 123 is configured to limit and fix the upright post 1711 and the support structure 11.

[0026] When the bolt 123 is passed through the third connecting hole and the fourth connecting hole, to limit the upright post 1711 and the support structure 11, so that the bolt 123 is configured to fix the upright post 1711 and the support structure 11 when the upright post 1711 is rotated to form an included angle with the support structure 11.

[0027] Referring to Figs. 3 and 4, in one embodiment of the present disclosure, the third connecting member 174 is disposed at an end of the upright post 1711 remote from the positioning structure 11, and the rotating joint between the upright post 1711 and the support structure 11 is spaced apart from the third connecting member 174 along a length direction of the upright post 1711.

[0028] Specifically, when the upright post 1711 is rotated to a plane perpendicular to the support structure 11, the end of the upright post 1711 is fixed by the limiting structure to reach the first state. An axial direction of the bolt 174 of the limiting structure is consistent with an axial direction of the upright post 1711. A portion of the upright post 1711 near the limiting structure is rotatably connected with the support structure 11. Specifically, the rotating shaft of the upright post 1711 is perpendicular to the axial direction of the upright post 1711, that is, the axial direction of the pin shaft 121 is perpendicular to the axial direction of the upright post 1711.

[0029] An opening is formed at the end of the upright post 1711 remote from the positioning structure 173, the opening is extended along the axial direction of the upright post 1711, the third connecting plate 174 is defined as two parallel

plates, the plate surfaces of the two plates are perpendicular to the axial direction of the upright post 1711, one plate is positioned in the opening, the other plate is configured to block the opening, and the two plates are provided with a third connecting hole, the two connecting holes are matched with each other. The support structure 11 is provided with a fourth connecting plate 174 perpendicular to the axis of the upright post 1711 when the upright post 1711 is rotated to be perpendicular to the support structure 11. The bolt 174 is passed through the fourth connecting hole and the two third connecting holes along the axis direction of the upright post 1711. The limiting structure can limit the rotation of the upright post 1711 on the support structure 11.

[0030] When the bolt 174 on the limiting structure is pulled away, the upright post 1711 can rotate on the support structure 11 to make the measuring and positioning structure 17 to be in a lower position.

[0031] In one embodiment of the present disclosure, the measuring and positioning structure 17 includes two positioning structures 173, the measuring frame 171 includes two upright posts 1711 which are oppositely arranged, a connecting bracket 1713 is connected between the two upright posts 1711, and the two positioning structures 173 are respectively fixed to the two upright posts 1711.

[0032] Under the common positioning of the two positioning structures 173, the obtained position of the support structure 11 is more accurate, and the two upright posts 1711 are connected by the connecting bracket 1713, so that the two upright posts 1711 of the measuring frame 171 can rotate relative to the support structure 11 at the same time, and the structure is simple.

[0033] In one embodiment of the present disclosure, the connecting bracket 1713 includes a connecting beams 1713a connected with two upright posts 1711. A quantity of the connecting beams 1713a is two, and the two connecting beams 1713a are arranged in parallel.

[0034] The two connecting beams 1713a can connect the two uprights 1711 well, so that the two uprights 1711 can rotate at the same time, and the structure is simple.

[0035] In one embodiment of the present disclosure, the connecting bracket 1713 further includes a plurality of reinforcing rods 1713b, and the reinforcing rods 1713b are connected to an area enclosed by the two upright posts 1711 and the two connecting beams 1713a.

[0036] As the two upright posts 1711 are arranged in parallel with each other and the two connecting beams 1713a are arranged in parallel with each other, a rectangular area is formed between the two upright posts 1711 and the two connecting beams 1713a, and the connection between the two upright posts 1711 is more stable due to the arrangement of the reinforcing rods 1713b.

[0037] Referring to Fig. 3, a connecting plate is fixed at each joint of the two upright posts 1711 and the connecting beam 1713a adjacent to the positioning structure 173. One connecting plate is fixed at the middle of the other connecting beam 1713a. There are three reinforcing rods 1713b. Both ends of each reinforcing rod 1713b are connected to two connecting plates located on the two connecting beams 1713a. Therefore, the reinforcing bar 1713b can divide the rectangular area into a plurality of triangular areas. Based on the stability of the triangles, the arrangement of the reinforcing bar 1713b can make the connection of the two upright posts 173 more stable and reliable.

[0038] In one embodiment of the present disclosure, the support structure 11 includes a support frame 113 and a buoyancy column 18, the support frame 113 is supported on the water bottom surface, the buoyancy column 18 is convexly arranged on one side of the support frame 113 facing away from the water bottom surface, the transport structure 13 is slidably connected to the support frame 113, and the measuring frame 171 is rotatably connected to the buoyancy column 18.

[0039] The buoyancy column 18 is convexly arranged on one side of the support frame 113 facing away from the water bottom surface, so that the measuring frame 171 rotatably connected to the buoyancy column 18 is lifted by a distance in the direction facing away from the water bottom surface, so that when the measuring frame 171 is rotated to form a zero degree included angle with the support structure 11, the measuring frame 171 can abut against an end surface of the buoyancy column 18, so that the whole measuring and positioning structure 17 and the support frame 113 maintain a certain distance, and the measuring and positioning structure 17 cannot interfere with the transport structure 13 and the distributing structure 155 moving on the support frame 113. The buoyancy column 18 is a hollow cylinder, which has a certain floating effect on the underwater support structure 11, thus reducing the total weight of the support structure 11 and facilitating the change of the position of the support structure 11.

[0040] When the upright post 1711 is rotated to the first state, the upright post 1711 rotates until the axial direction of the upright post 1711 is consistent with the axial direction of the buoyancy column 18, and the upright post 1711 and the buoyancy column 18 partially overlap along the axial direction. One end of the upright post 1711 facing away from the positioning structure 173 is detachably connected to the buoyancy column 18 through the limiting structure, so that the positioning structure 173 positioned at the end of the upright post 1711 can reach the highest position. A portion of the upright post 1711 near the limiting structure is rotatably connected to a free end of the buoyancy column 18, and the free end is an end of the buoyancy column 18 facing away from the support frame 113. By pulling out the bolt of the limiting structure, one end of the upright post 1711 facing away from the positioning structure 173 is separated from the buoyancy column 18. The upright post 1711 is rotated to abut against the free end of the buoyancy column 18 and is

parallel to the plane where the support structure 11 is located, to reach the second state. It is measured that the overall height of the positioning structure 17 is decreased, so that the paver 10 is integrally accommodated in the base groove.

[0041] In one embodiment of the present disclosure, in the first state, one end of the upright post 1711 fixed with the positioning structure 173 is extended out of the water surface, so that the positioning effect of the positioning structure 173 is better.

[0042] The positioning structure 173 is a GPS (Global Positioning System), specifically, a RTK (Real-time kinematic, Carrier Phase Difference Technology). The RTK can provide three-dimensional positioning results of the measured position in a specified coordinate system in real time and achieve centimeter-level accuracy. So that, the obtained position information of the support structure 11 is more accurate.

[0043] The support frame 113 includes two opposite first crossbeams 1131 and two opposite second crossbeams 1133. The first crossbeams 1131 and the second crossbeams 1133 are connected end to end. There are four buoyancy columns 18. Each buoyancy column 18 is arranged at one joint of the first crossbeam 1131 and the first second crossbeams 1133. The measuring structure 171 is rotatably connected to the two buoyancy columns 18 which are positioned on the same side. The support frame 113 also includes a plurality of support legs 16. The plurality of support legs 16 are symmetrically connected to the two first crossbeams and/or the two second crossbeams, and are supported on the water bottom surface. The first crossbeams 1131 and/or the second crossbeams 133 are provided with guide rails 111, and the transport structure 13 is slidably connected to the guide rails 111.

[0044] The paver 10 is supported on the water bottom surface by the support leg 16, and can directly perform laying and paving work under water. While the work platform of the existing floating leveling ship or the platform leveling ship with positioning piles is located on or above the water surface, and partial structural of the leveling ship needs to be adjusted according to the water depth. The auto-paver system 100 of the present disclosure can be suitable for requirements of different water depths, and has wide applicability.

[0045] The support leg 16 includes a driving part 162, a leg 161, and a connecting part 163. The driving part 162 is configured to drive the leg 161 and the connecting part 163 to move relative to each other in an up-down direction, so that the height of the support structure 11 on the water bottom surface can be adjusted, and the height of the distributing structure 155 on the water bottom surface can be adjusted, so that the distributing structure 155 can be applied to the bottom surfaces of the base grooves with different concavities and convexities, and the applicability range of the auto-paver system 100 of the present disclosure is wider.

[0046] Under the adjustment of the support leg 16, the distance between the lower surfaces of the first crossbeam 1131 and the second crossbeam 1133 and the water bottom surface is in a range of 800 mm to 2800 mm, so that a distance between the discharge port 1553 of the distributing structure 155 and the water bottom surface is in a range of 0 mm to 2000 mm. In this size range, when the auto-paver system 100 works, the paver 10 is close to the water bottom surface, so that the transport structure 13 slidably connected to the support frame 113 and the distributing structure 155 connected to the transport structure are close to the water bottom surface, and the material transported by the distributing structure 155 during the movement of the support frame 113 is short, so that the output process is less affected by water flows and the laying is accurate. That is, under the adjustment of the support leg 16, the distance between the support frame 113 and the water bottom surface (that is, the bottom surface of the base groove) can be adjusted between 800 mm and 2800 mm, so that the distance between the discharge port 1553 of the distributing structure 155 and the water bottom surface can be adjusted between 0 mm and 2000 mm.

[0047] The guide rail 111 can restrict the transport structure 13 to move along a certain track, so that the material distribution structure 155 can evenly lay the material in the area where the guide rail 111 can reach. The structure and shape of the guide rail 111 determine the laying trajectory of the distributing structure 155. The structure and shape of the guide rail 111 can be changed according to different requirements, so that the auto-paver system 100 can adapt to different working requirements. The rationality of the arrangement of the guide rail 111 can affect the smoothness of gravel laying on the water floor. Therefore, under the restriction of the guide rail 111, the track traveled by the transport structure 13, the shape of the discharge port 1553 of the distribution structure 155 and the amount of the laying material need to be well matched, so that the water bottom surface to be laid can achieve a required forming effect.

[0048] In one embodiment of the present disclosure, the guide rail 111 is disposed on the second crossbeam 1133, the transport structure 13 is slidably connected to the guide rail 111, and the support legs 16 are symmetrically connected to the two second crossbeams 1133.

[0049] Each support leg 16 can be adjusted separately, so that the height of the position where any support leg 16 is connected to the support frame 113 can be adjusted separately, thereby controlling the inclination angle of the support frame 113.

[0050] As the guide rail 111 is arranged on the second crossbeam 1133, the transport structure 13 and the distributing structure 155 are mainly carried by the second crossbeam 1133. So that, the support leg 16 is connected to the second crossbeam 1133, and the load-bearing capacity of the second crossbeam 1133 is stronger, the transport structure 13 and the distributing structure 155 can maintain high consistency during their movements on the guide rail 111, and the paving effect of the distributing structure 155 is better.

[0051] In one embodiment of the present disclosure, the guide rail 111 includes two symmetrically arranged longitudinal guide rails 1111 and two symmetrically arranged transverse guide rails 1113, the longitudinal guide rails 1111 are arranged in parallel with the first crossbeam 1131, and the transverse guide rails 1113 are arranged in parallel with the second crossbeam 1133. Referring to Fig. 1, in one embodiment, two symmetrically arranged transverse guide rails 1113 are respectively fixed to two second crossbeams 1133, and two longitudinal guide rails 1111 are slidably connected to the two transverse guide rails 1113. Specifically, one end of each longitudinal guide rail 1111 is slidably connected to one transverse guide rail 1113, and the other end of each longitudinal guide rail 1111 is slidably connected to another transverse guide rail 1113. The second crossbeam 1133 is provided with a drive motor and a chain arranged along an extension direction of the second crossbeam 1133. The chain is connected with the two longitudinal guide rails 1111. Under the drive of the motor, the chain is configured to drive the longitudinal guide rails 1111 to reciprocate along the transverse guide rails 1113 (i.e., to reciprocate along the extension direction of the second crossbeam 1133). It can be understood that the longitudinal guide rail 1111 can also be slidably connected to the transverse guide rail 1113 by other driving means, for example, a roller and a driving structure provided on the longitudinal guide rail. The driving structure is configured to drive the roller to roll on the transverse guide rail, so that the longitudinal guide rail can slide relative to the transverse guide rail on the transverse guide rail.

[0052] Before laying materials, or when the auto-paver system 100 restarts after a halfstopping, sludge may accumulate on the bottom surface of the base groove due to the influence of water flows. A sludge suction structure 145 needs to be arranged on the transport structure 13 to suck sludge, so as to prevent sludge from being mixed with crushed stones and affecting the supporting effect of the bottom surface of the base tank on the sinking pipe.

[0053] Referring to Fig. 6, in one embodiment of the present disclosure, the paver 10 further includes a sludge suction structure 145 connected to the transport structure 13, the sludge suction structure 145 is provided with a sludge discharge port 1453 and a sludge suction port 1451 extending in the direction towards the water bottom surface, and is provided with a sludge suction driving member communicating the sludge suction port 1451 and the sludge discharge port 1453.

[0054] The sludge suction port 1451 of the sludge suction structure 145 is extended towards the water bottom surface. The transport structure 13 is configured to move along the guide rail 111 and drive the sludge suction structure 145 to move to the position where sludge needs to be sucked. The sludge suction driving member is turned on, submerged sludge is entered into the sludge suction structure 145 through the sludge suction port 1451 and is discharged through the sludge discharge port 1453 to remove the accumulated sludge and prepare for paving work.

[0055] In one embodiment of the present disclosure, the auto-paver system 100 includes a workbench 30 arranged on the water surface, the workbench 30 is provided with a main controller (not shown), the main controller is electrically connected with the transport structure 13, to control the transport structure 13 ito drive the distributing structure 155 to move on the support structure 13 and lay materials through the discharge port 1553;

[0056] The main controller is electrically connected to the positioning structure 173 to acquire the position information obtained by the positioning structure 173.

[0057] The main controller is configured to calculate the position information of the support structure 11 according to the position information acquired by the positioning structure 17, so that the external structure can be controlled to place the support structure 11 at a specified position.

[0058] The measuring frame is rotatably connected to the support frame 113, and the main controller can be electrically connected to the measuring frame to control the measuring frame to rotate relative to the support frame 113, so that the measuring frame is extended out of the water surface or is folded on the support frame 113. When the auto-paver system 100 stops working in the middle, the main controller controls the measuring frame to fold on the support frame 113, so that the measuring frame does not obstruct the navigation channel when the auto-paver system 100 stops working, and when the auto-paver system 100 starts running again, the main controller controls the measuring frame to extend out of the water surface to position the support frame 113. It is understood that the support positioning structure 17 can also be rotatably covered on the support structure by an external structure.

[0059] Workers operate the transport structure 13 on the workbench 30, which can automatically control the auto-paver system 100, for reducing the underwater workload of workers and ensuring the personal safety of workers.

[0060] Referring to Fig. 6, in one embodiment of the present disclosure, the auto-paver system 100 further includes a blanking hopper 151 and a distributing pipe 153, the blanking hopper 151 is arranged on the workbench 30, one end of the distributing pipe 153 is communicated with the blanking hopper 151, and the other end of the distributing pipe 153 is communicated with the feed port 1551 of the distributing structure 155.

[0061] The materials in the blanking hopper 151 can slide down the distributing pipe 153 into the distributing structure 155 under the action of gravity only, and finally fall to the bottom surface of the base groove from the discharging port 1553 of the distributing structure 155. Understandably, the blanking hopper 151 may be provided with a power structure to accelerate the falling of materials.

[0062] The main controller is configured to control the amount of material dropped into the distributing pipe 153 by the blanking hopper 151, thereby controlling the amount of material discharged from the distributing structure 155 through the distributing pipe 153; or the main controller directly is configured to control the discharging amount of the discharging

port 1553 of the distributing structure 155. The workers can control the discharge amount of materials by operating the main controller on the workbench 30. Combined the control of the main controller on the running track of the transport structure 13, the distributing structure 155 can evenly lay materials on the water bottom surface. When the paver 10 of the auto-paver system 100 performs laying work, the lower end of the distributing pipe 153 is driven by the distributing structure 155 to move, while the upper end of the distributing pipe 153 is connected to the blanking hopper 151 on the water surface without moving, so the paver 10 is less affected by water flows during paving.

[0063] The distributing structure 155 is also provided with an underwater camera, which is electrically connected to a detection screen (not shown) on the workbench 30. During the operation of the auto-paver system 100, the worker can observe the height of the materials stored in the distributing structure 155 through the detection screen on the workbench 30, so as to better operate the main controller and adjust the blanking amount of the blanking hopper 151.

[0064] In one embodiment of the present disclosure, the auto-paver system 100 further includes a sludge suction pipe 143 and a storage structure 141 arranged on the workbench 30. One end of the sludge suction pipe 143 is communicated with the sludge discharge port 1453 of the sludge suction structure 145, and the other end of the sludge suction pipe 143 is communicated with the storage structure 141. The main controller is electrically connected with the sludge suction driving member, to control the sludge suction structure 145 to suck sludge on the water bottom. The sludge suction driving member is a hydraulic pump, and the transport structure 13 moves on the support frame 113 to transport the sludge suction structure 145 to a designated position for sludge suction. The lower part of the suction pipe 143 is driven to move by the suction structure 145 while the upper part of the suction pipe 143 is fixed to the storage structure 141 during the suction process of the suction structure 145, keeping the position unchanged, and the suction process is hardly affected by water flow.

[0065] Referring to Figs. 7 and 8, in one embodiment of the present disclosure, the auto-paver system 100 further includes a retraction structure 50, the retraction structure 50 includes a driving piece 51 and a connecting piece 53 connected with the driving piece 51, the driving piece 51 is connected with the workbench 30, the connecting piece 53 is detachably connected with the support frame 113, the main controller is electrically connected with the driving piece 51, to control the driving part 162 to move to a specified position of the support frame 113 when the connecting piece 53 is connected with the support frame 113.

[0066] When the paver 10 of the auto-paver system 100 completes a paving operation, the connecting piece 53 of the retraction structure 50 is connected to the support frame 113 by a manual operation or under a control of the main controller. The driving piece 51 is configured to drive the connecting piece 53 to lift the support frame 113 from the water bottom until the measuring positioning structure 16 leaves the water bottom for a distance, and moves the support frame 113 to a next area to be paved, and then sinks the support frame 113 to the water bottom until the measuring positioning structure 16 is supported on the water bottom surface of the next area to be paved. The connecting piece 53 is separated from the support frame 113 by the manual operation or under the control of the main controller. The paver 10 performs the next paving operation.

[0067] The auto-paver system 100 adopts automatic operation, so that workers can operate and monitor the underwater paving work on the working table 30 on the water, almost no underwater operation is needed, thus ensuring the safety of workers, and the automatic control process enables the auto-paver system 100 to have high construction efficiency for underwater paving.

[0068] Referring to Figs. 2 and 3, the driving member 51 of the retraction structure 50 can be a motor and is installed on the workbench 30. The connecting member 53 can be a steel cable, one end of the steel cable is connected to the motor and the other end of the steel cable is submerged by a worker and tied to the support frame 113 of the support structure 11. The main controller is configured to control the starting motor to lift the support structure 11 for a certain distance through the steel cable, then after the workbench moves for a certain distance along the length direction of the base groove the main controller is configured to control the motor to drive the steel cable to sink the support frame 113 in the next area to be paved.

[0069] Understandably, the connecting piece 53 can also be a connecting frame. The main controller is configured to control the driving piece (motor or air cylinder) to combine with the positioning structure to provide the positioning information, to control the connecting frame to automatically extend to the position where the support frame 113 is located. The connecting frame is manually fixed to the support frame 113 through bolts, screws or snap structures, or the connecting frame is automatically fixed to the support frame 113 under the control of the main controller. Under the further control of the main controller, the connecting piece 53 is configured to move the support frame 113 to the next area to be paved.

[0070] In one embodiment of the present disclosure, the distributing structure 155 is further provided with a detection piece (not shown), which is configured to detect flat value information of the water bottom surface, and detect the flat degree of the area to be paved on which the material has been laid, and feed back the result to the main controller for further work.

[0071] The workbench 30 may include a first workbench 31, a second workbench 33, and a third workbench 35. The first workbench 31 is configured to set the main controller and the blanking hopper 151. The main controller is configured

to control all the required electrical control structures on the paver 10. The first workbench 31 is also provided with a water pump. Gravel in the blanking hopper 151 is fed into the distributing pipe 153 together with water pumped by the water pump. The second workbench 33 is provided with a storage structure 141, and the main controller for driving the sludge suction driving member may also be provided on the second workbench 33. The storage structure 141 is configured to store sludge transported by the sludge suction structure 145 through the sludge suction pipe 143. The third workbench 35 is configured to set the retraction structure 50, and the third workbench 35 is provided with the main controller electrically connected with the retraction structure 50. The main controller is configured to control the movement of the driving piece 51 of the retraction structure 50 and drive the connecting piece 53 to perform actions.

Claims

1. An auto-paver system (100) with a measuring and positioning structure (17), comprising a paver (10), the paver (10) comprising:

   a support structure (11) supported on a water bottom surface;
   a transport structure (13) slidably connected to the support structure (11); and
   a distributing structure (155) connected to the transport structure (13), and comprising a feed port (1551) and a discharge port (1553) through which materials pass, the discharge port (1553) being configured to be extended towards the water bottom surface, and the transport structure (13) being configured to drive the distributing structure (155) to move on the support structure (11) to lay materials through the discharge port (1553);
   characterized in that the measuring and positioning structure (17) comprises a measuring frame (171) and at least one positioning structure (173), one end of the measuring frame (171) being rotatably connected with the support structure (11), and the positioning structure (173) being fixed to the other end of the measuring frame (171).

2. The auto-paver system (10) with a measuring and positioning structure (17) of claim 1, wherein the measuring frame (171) comprises at least one upright post (1711), one end of the upright post (1711) being rotatably connected to the support structure (11), and the positioning structure (173) being fixed to the other end of the upright post (1711).

3. The auto-paver system (10) with a measuring and positioning structure (17) of claim 2, wherein the upright post (1711) comprises a first connecting piece (182), the first connecting piece (182) defines a first connecting hole, the support structure (11) comprises a second connecting piece (172) matched with the first connecting piece (182), the second connecting piece (172) defines a second connecting hole matched with the first connecting hole, and a pin shaft (121) is configured to pass through the first connecting hole and the second connecting hole matched with the first connecting hole to rotatably connect the upright post (1711) and the support structure (11).

4. The auto-paver system (10) with a measuring and positioning structure (17) of claim 2, wherein the paver (10) further comprises a limiting structure, and when the upright post (1711) is rotated to form an included angle with the support structure (11), the limiting structure is configured to limit and fix the upright post (1711) and the support structure (11).

5. The auto-paver system (10) with a measuring and positioning structure (17) of claim 4, wherein the limiting structure comprises a third connecting piece (184) arranged on the upright post (1711) and a fourth connecting piece (174) arranged on the support structure (11), the third connecting piece (184) defines a third connecting hole, the fourth connecting piece (174) defines a fourth connecting hole matched with the third connecting hole, a bolt (123) is detachably passed through the third connecting hole and the fourth connecting hole to detachably connect the upright post (1711) and the support structure (11), and when the upright post (1711) is rotated to form the included angle with the support structure (11), the bolt (123) is configured to limit and fix the upright post (1711) and the support structure (11).

6. The auto-paver system (10) with a measuring and positioning structure (17) of claim 5, wherein the third connecting piece (184) is arranged at an end of the upright post (1711) far away from the positioning structure (173), and a rotating joint of the upright post (1711) and the support structure (11) is spaced apart from the third connecting piece (184) along a length direction of the upright post (1711).

7. The auto-paver system (10) with a measuring and positioning structure (17) of claim 2, wherein the measuring and positioning structure (17) comprises two positioning structures (173), the measuring frame (171) comprises two opposite upright posts (1711), a connecting bracket (1713) is connected between the two upright posts (1711), and

the two positioning structures (173) are respectively fixed to the two upright posts (1711).

8. The auto-paver system (10) with a measuring and positioning structure (17) of any one of claims 1 to 5, wherein the support structure (11) comprises a support frame (113) and a buoyancy column (18), the support frame (113) is supported on the water bottom surface, the buoyancy column (18) is convexly arranged on a side of the support frame (113) facing away from the water bottom surface, the transport structure (13) is slidably connected to the support frame (113), and the measuring frame (171) is rotatably connected to the buoyancy column (18); and/or, the positioning structure (173) is a GPS.

9. The auto-paver system (10) with a measuring and positioning structure (17) of any one of claims 1 to 3, further comprising a workbench (30) arranged on a water surface, the workbench (30) is provided with a main controller, the main controller is configured to electrically connect with the transport structure (13), and control the transport structure (13) to drive the distributing structure (155) to move on the support structure (11), to pave the materials through the discharge port (1553); the main controller is electrically connected with the positioning structure (173) to acquire position information obtained by the positioning structure (173).

10. The auto-paver system (10) with a measuring and positioning structure (17) of claim 4 or claim 5, further comprising a workbench (30) arranged on a water surface, the workbench (30) is provided with a main controller, the main controller is configured to electrically connect with the transport structure (13), and control the transport structure (13) to drive the distributing structure (155) to move on the support structure (11), to pave the materials through the discharge port (1553); the main controller is electrically connected with the positioning structure (173) to acquire position information obtained by the positioning structure (173).

11. The auto-paver system (10) with a measuring and positioning structure (17) of claim 9, wherein the auto-paver system (10) further comprises a blanking hopper (151) and a distributing pipe (153), the blanking hopper (151) is arranged on the workbench (30), one end of the distributing pipe (153) is communicated with the blanking hopper (151), the other end of the distributing pipe (153) is communicated with the feed port (1551) of the distributing structure (155), and the main controller is electrically connected with the blanking hopper (151) or the distributing structure (155);
and/or, the auto-paver system (10) with a measuring and positioning structure (17) of claim 9 further comprises a retracting structure, the retracting structure comprises a driving piece (51) and a connecting piece (53) connected with the driving piece (51), the driving piece (51) is connected with the workbench (30), the connecting piece (53) is detachably connected with the support structure (11), the main controller is electrically connected with the driving piece (51), to control the driving piece (51) to move the support structure (11) to a specified position when the connecting piece (53) is connected with the support structure (11).

Patentansprüche

1. Automatisches Fertigersystem (100) mit einer Mess- und Positionierstruktur (17), umfassend einen Fertiger (10), wobei der Fertiger (10) Folgendes umfasst:

   eine Stützstruktur (11), die auf einer Wasserbodenoberfläche gestützt wird;
   eine Transportstruktur (13), die verschiebbar mit der Stützstruktur (11) verbunden ist; und
   eine Verteilungsstruktur (155), die mit der Transportstruktur (13) verbunden ist und eine Zuführöffnung (1551) und eine Entladungsöffnung (1553) umfasst, durch die die Materialien durchlaufen, wobei die Entladungsöffnung (1553) so konfiguriert ist, dass sie sich auf die Wasserbodenoberfläche erstreckt, und wobei die Transportstruktur (13) so konfiguriert ist, dass sie die Verteilungsstruktur (155) dazu antreibt, sich auf der Stützstruktur (11) zu bewegen, um die Materialien durch die Entladungsöffnung (1553) zu legen;
   dadurch gekennzeichnet, dass die Mess- und Positionierstruktur (17) einen Messrahmen (171) und mindestens eine Positionierstruktur (173) umfasst, wobei ein Ende des Messrahmens (171) drehbar mit der Stützstruktur (11) verbunden ist, und wobei die Positionierstruktur (173) am anderen Ende des Messrahmens (171) befestigt ist.

2. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 1, wobei der Messrahmen (171) mindestens einen aufrechten Pfosten (1711) umfasst, und wobei ein Ende des aufrechten Pfostens (1711) drehbar mit der Stützstruktur (11) verbunden ist, und wobei die Positionierstruktur (173) an dem anderen Ende des aufrechten Pfostens (1711) befestigt ist.

3. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 2, wobei der aufrechte Pfosten (1711) ein erstes Verbindungsstück (182) umfasst, das ein erstes Verbindungsloch definiert, und wobei die Stützstruktur (11) ein mit dem ersten Verbindungsstück (182) zusammenpassendes zweites Verbindungsstück (172) umfasst, das ein mit dem ersten Verbindungsloch zusammenpassendes zweites Verbindungsloch definiert, und wobei ein Stiftschaft (121) so konfiguriert ist, dass sie durch das erste Verbindungsloch und das mit dem ersten Verbindungsloch zusammenpassende zweite Verbindungsloch hindurchgeht, um den aufrechten Pfosten (1711) und die Stützstruktur (11) drehbar zu verbinden.

4. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 2, wobei der Straßenfertiger (10) weiterhin eine Begrenzungsstruktur umfasst, und wobei, wenn der aufrechte Pfosten (1711) gedreht wird, um mit der Stützstruktur (11) einen eingeschlossenen Winkel zu bilden, die Begrenzungsstruktur dazu konfiguriert ist, den aufrechten Pfosten (1711) und die Stützstruktur (11) zu begrenzen und zu fixieren.

5. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 4, wobei die Begrenzungsstruktur ein an dem aufrechten Pfosten (1711) angeordnetes drittes Verbindungsstück (184) und ein an der Stützstruktur (11) angeordnetes viertes Verbindungsstück (174) umfasst, und wobei das dritte Verbindungsstück (184) ein drittes Verbindungsloch und das vierte Verbindungsstück (174) ein mit dem dritten Verbindungsloch zusammenpassendes viertes Verbindungsloch definiert, und wobei ein Bolzen (123) lösbar durch das dritte Verbindungsloch und das vierte Verbindungsloch hindurchgeführt ist, um den aufrechten Pfosten (1711) und die Stützstruktur (11) lösbar zu verbinden, und wobei, wenn der aufrechte Pfosten (1711) gedreht wird, um mit der Stützstruktur (11) den eingeschlossenen Winkel zu bilden, der Bolzen (123) dazu konfiguriert ist, den aufrechten Pfosten (1711) und die Stützstruktur (11) zu begrenzen und zu fixieren.

6. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 5, wobei das dritte Verbindungsstück (184) an einem weit von der Positionierstruktur (173) liegenden Ende des aufrechten Pfostens (1711) angeordnet ist, und wobei ein Drehgelenk des aufrechten Pfostens (1711) und der Stützstruktur (11) von dem dritten Verbindungsstück (184) entlang einer Längsrichtung des aufrechten Pfostens (1711) beabstandet ist.

7. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 2, wobei die Mess- und Positionierstruktur (17) zwei Positionierstrukturen (173) umfasst, und wobei der Messrahmen (171) zwei gegenüberliegende aufrechte Pfosten (1711) umfasst, und wobei eine Verbindungsklammer (1713) zwischen den beiden aufrechten Pfosten (1711) verbunden ist, und wobei die beiden Positionierstrukturen (173) jeweils an den beiden aufrechten Pfosten (1711) befestigt sind.

8. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach einem der Ansprüche 1 bis 5, wobei die Stützstruktur (11) einen Stützrahmen (113) und eine Auftriebssäule (18) umfasst, und wobei der Stützrahmen (113) auf der Wasserbodenoberfläche gestützt ist, und wobei die Auftriebssäule (18) auf einer der Wasserbodenoberfläche abgewandten Seite des Stützrahmens (113) hervorstehend angeordnet ist, und wobei die Transportstruktur (13) mit dem Stützrahmen (113) verschiebbar verbunden ist, und wobei der Messrahmen (171) drehbar mit der Auftriebssäule (18) verbunden ist; und/oder wobei die Positionierstruktur (173) ein GPS ist.

9. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach einem der Ansprüche 1 bis 3, umfassend weiterhin eine Werkbank (30), die auf einer Wasseroberfläche angeordnet ist, wobei die Werkbank (30) mit einer Hauptsteuerung ausgestattet ist, die dazu konfiguriert ist, mit der Transportstruktur (13) elektrisch verbunden zu werden und die Transportstruktur (13) dazu anzusteuern, die Verteilungsstruktur (155) dazu anzutreiben, sich auf der Stützstruktur (11) zu bewegen, um die Materialien durch die Entladungsöffnung (1553) zu pflastern; und wobei die Hauptsteuerung mit der Positionierstruktur (173) elektrisch verbunden ist, um die von der Positionierstruktur (173) erhaltenen Positionsinformationen zu erfassen.

10. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 4 oder 5, umfassend weiterhin eine Werkbank (30), die auf einer Wasseroberfläche angeordnet ist, wobei die Werkbank (30) mit einer Hauptsteuerung ausgestattet ist, die dazu konfiguriert ist, mit der Transportstruktur (13) elektrisch verbunden zu werden und die Transportstruktur (13) dazu anzusteuern, die Verteilungsstruktur (155) dazu anzutreiben, sich auf der Stützstruktur (11) zu bewegen, um die Materialien durch die Entladungsöffnung (1553) zu pflastern; und wobei die Hauptsteuerung mit der Positionierstruktur (173) elektrisch verbunden ist, um die von der Positionierstruktur (173) erhaltenen Positionsinformationen zu erfassen.

11. Automatisches Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 9, wobei das auto-

matische Fertigersystem (10) weiterhin einen Einfülltrichter (151) und ein Verteilerrohr (153) umfasst, und wobei der Einfülltrichter (151) auf der Werkbank (30) angeordnet ist, und wobei ein Ende des Verteilerrohrs (153) mit dem Einfülltrichter (151) und das andere Ende des Verteilerrohrs (153) mit der Zuführöffnung (1551) der Verteilungsstruktur (155) verbunden ist, und wobei die Hauptsteuerung mit dem Einfülltrichter (151) oder der Verteilungsstruktur (155) verbunden ist;
und/oder das automatische Fertigersystem (10) mit einer Mess- und Positionierstruktur (17) nach Anspruch 9 weiterhin eine Einfahrstruktur umfasst, wobei die Einfahrstruktur ein Antriebsstück (51) und ein mit dem Antriebsstück (51) verbundenes Verbindungsstück (53) umfasst, und wobei das Antriebsstück (51) mit der Werkbank (30) verbunden ist, und wobei das Verbindungsstück (53) lösbar mit der Stützstruktur (11) verbunden ist, und wobei die Hauptsteuerung mit dem Antriebsstück (51) elektrisch verbunden ist, um das Antriebsstück (51) dazu anzusteuern, die Stützstruktur (11), wenn das Verbindungsstück (53) mit der Stützstruktur (11) verbunden ist, in eine bestimmte Position zu bewegen.

Revendications

1. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17), comprenant un finisseur (10), le finisseur (10) comprenant :

   une structure d'appui (11) appuyée sur une surface de fond de l'eau ;
   une structure de transport (13) raccordée de manière coulissante à la structure d'appui (11) ; et
   une structure de distribution (155) raccordée à la structure de transport (13), et comprenant un port d'alimentation (1551) et un port de déchargement (1553) à travers lequel passent les matériaux, le port de déchargement (1553) étant configuré pour se prolonger vers la surface du fond de l'eau, et la structure de transport (13) étant configurée pour entraîner le déplacement de la structure de distribution (155) sur la structure d'appui (11) afin de poser les matériaux via le port de déchargement (1553) ;
   caractérisé en ce que la structure de mesure et de positionnement (17) comprend un cadre de mesure (171) et au moins une structure de positionnement (173), une extrémité du cadre de mesure (171) étant raccordée de façon rotative à la structure d'appui (11), et la structure de positionnement (173) étant fixée à l'autre extrémité du cadre de mesure (171).

2. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 1, dans lequel le cadre de mesure (171) comprend au moins un montant vertical (1711), une extrémité du montant vertical (1711) étant raccordée de façon rotative à la structure d'appui (11), et la structure de positionnement (173) étant fixée l'autre extrémité du montant vertical (1711).

3. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 2, dans lequel le montant vertical (1711) comprend une première pièce de raccordement (182), la première pièce de raccordement (182) délimite un premier trou de raccordement, la structure d'appui (11) comprend une deuxième pièce de raccordement (172) correspondant à la première pièce de raccordement (182), la deuxième pièce de raccordement (172) délimite un deuxième trou de raccordement correspondant au premier trou de raccordement, une tige de goupille (121) est configurée pour passer à travers le premier trou de raccordement et le deuxième trou de raccordement correspondant au premier trou de raccordement pour raccorder de façon rotative le montant vertical (1711) et la structure d'appui (11).

4. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 2, dans lequel le finisseur (10) comprend en outre une structure de limitation, et lorsque le montant vertical (1711) pivote pour former un angle inclus avec la structure d'appui (11), la structure de limitation est configurée pour limiter et fixer le montant vertical (1711) et la structure d'appui (11).

5. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 4, dans lequel la structure de limitation comprend une troisième pièce de raccordement (184) agencée sur le montant vertical (1711) et une quatrième pièce de raccordement (174) agencée sur la structure d'appui (11), troisième pièce de raccordement (184) délimite un troisième trou de raccordement, le quatrième pièce de raccordement (174) délimite un quatrième trou de raccordement correspondant au troisième trou de raccordement, un boulon (123) est passé de façon détachable à travers le troisième trou de raccordement et le quatrième pièce de raccordement pour connecter de façon détachable le montant vertical (1711) et la structure d'appui (11), et lorsque le montant vertical (1711) pivote pour former un angle inclus avec la structure d'appui (11), le boulon (123) est

configuré pour limiter et fixer le montant vertical (1711) et la structure d'appui (11).

6. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 5, dans lequel la troisième pièce de raccordement (184) est agencée à une extrémité du montant vertical (1711) distante de la structure d'appui (173), et une articulation rotative du montant vertical (1711) et la structure d'appui (11) sont espacées de la troisième pièce de raccordement (184) dans le sens de la longueur du montant vertical (1711).

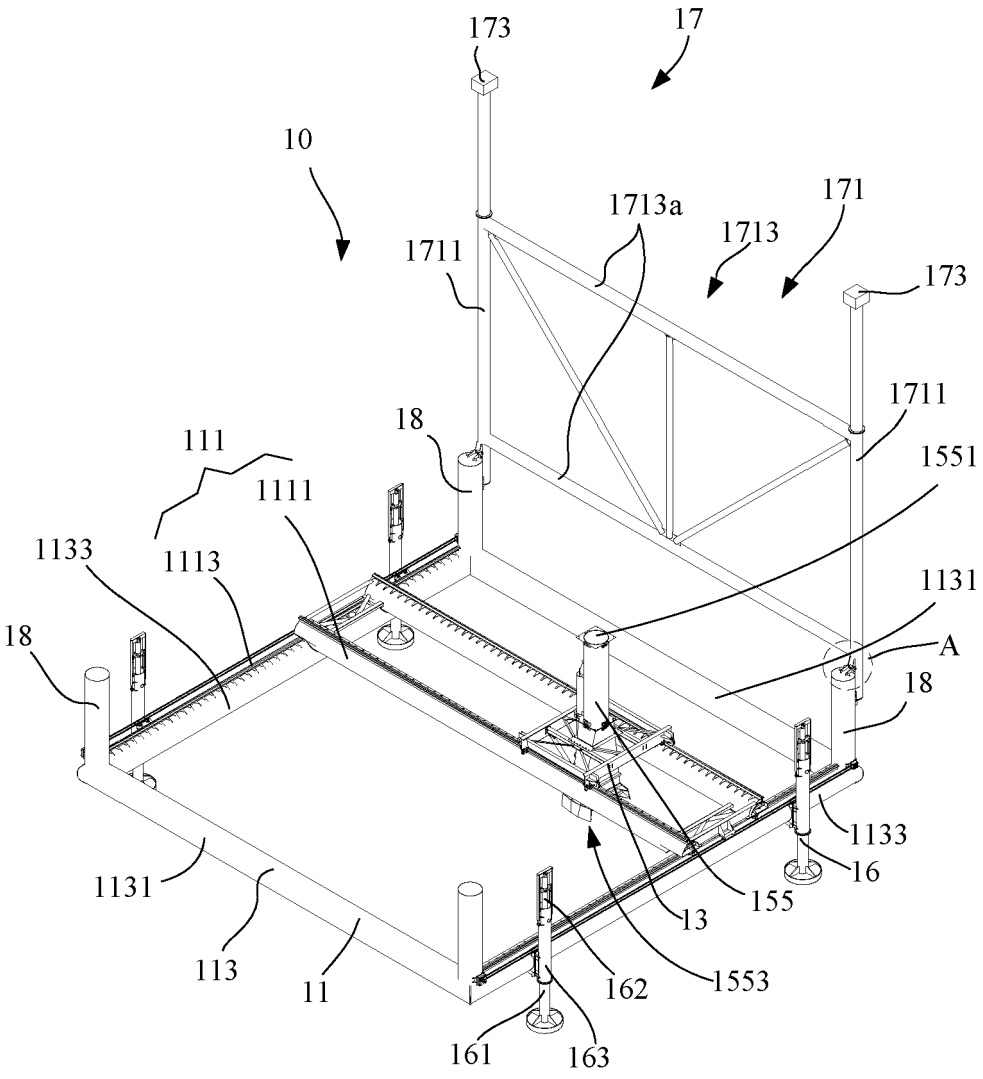
7. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 2, dans lequel la structure de mesure et de positionnement (17) comprend deux structures de positionnement (173), le cadre de mesure (171) comprend deux montants verticaux opposés (1711), une barre de raccordement (1713) est raccordée entre les deux montants verticaux (1711), et les deux structures de positionnement (173) sont respectivement fixées sur les deux montants verticaux (1711).

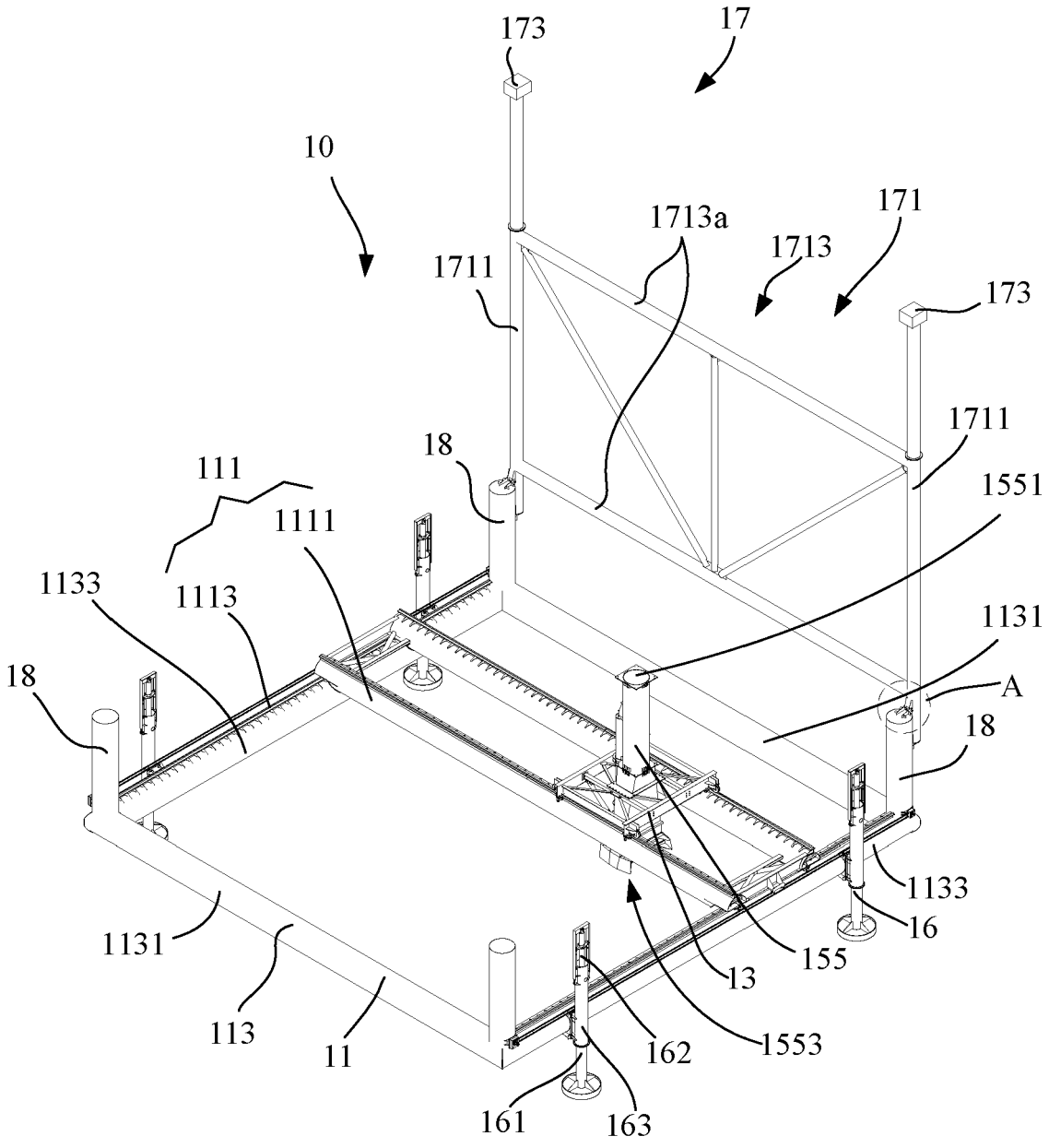
8. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon l'une quelconque des revendications 1 à 5, dans lequel la structure d'appui (11) comprend un cadre d'appui (113) et une colonne de flottaison (18), le cadre d'appui (113) est appuyé contre la surface du fond de l'eau, la colonne de flottaison (18) est agencée de façon convexe sur un côté du cadre d'appui (113) faisant dos à la surface du fond de l'eau, la structure de transport (13) est raccordée de façon coulissante au cadre d'appui (113), et le cadre de mesure (171) est raccordé de façon rotative à la colonne de flottaison (18) ; et/ou, la structure de positionnement (173) est un GPS.

9. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon l'une quelconque des revendications 1 à 3, comprenant en outre un plan de travail (30) agencé sur la surface de l'eau, le plan de travail (30) est muni d'un contrôleur principal, le contrôleur principal est configuré pour être raccordé électriquement à la structure de transport (13), et commander à la structure de transport (13) d'entrainer le déplacement de la structure de distribution (155) sur la structure d'appui (11), afin de paver les matériaux à travers le port de déchargement (1553) ; le contrôleur principal est raccordé électriquement à la structure de positionnement (173) pour acquérir les informations de position obtenues par le structure de positionnement (173).

10. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon l'une quelconque des revendications 4 et 5, comprenant en outre un plan de travail (30) agencé sur la surface de l'eau, le plan de travail (30) est muni d'un contrôleur principal, le contrôleur principal est configuré pour être raccordé électriquement à la structure de transport (13), et commander à la structure de transport (13) d'entrainer le déplacement de la structure de distribution (155) sur la structure d'appui (11), afin de paver les matériaux à travers le port de déchargement (1553) le contrôleur principal est raccordé électriquement à la structure de positionnement (173) pour acquérir les informations de position obtenues par le structure de positionnement (173).

11. Un système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 9, comprenant en outre une trémie à obturation (151) et un conduit de distribution (153), la trémie à obturation (151) est agencée sur le plan de travail (30), une extrémité du conduit de distribution (153) communique avec la trémie à obturation (151), l'autre extrémité du conduit de distribution (153) communique avec le port d'alimentation (1551) de la structure de distribution (155), et le contrôleur principal est raccordée électriquement à la trémie à obturation (151) ou à la structure de distribution(155) ;
et/ou, système de finisseur automatique (100) muni d'une structure de mesure et de positionnement (17) selon la revendication 9, comprenant en outre une structure rétractable, la structure rétractable comprend une pièce d'entraînement (51) et une pièce de raccordement (53) raccordée à la pièce d'entrainement (51), la pièce d'entrainement (51) est raccordée au plan de travail (30), la pièce de raccordement (53) est raccordée de façon détachable à la structure d'appui (11), le contrôleur principal est raccordé électriquement à la pièce d'entraînement (51), afin de commander le déplacement de la pièce d'entrainement (51) sur la structure d'appui (11) jusqu'à une position spécifiée lorsque la pièce de raccordement (53) est raccordée à la structure d'appui (11).


100
173
17
10
1713a
171
1713
1711
173
1711
18
111
1111
1551
1133
1113
1131
18
A
18
1133
16
1131
155
13
113
11
162
1553
161
163


100
173
17
10
1713a
171
1711
1713
173
1711
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111
1551
1111
1133
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A
18
1133
16
1131
155
13
113
11
162
1553
161
163

FIG. 1

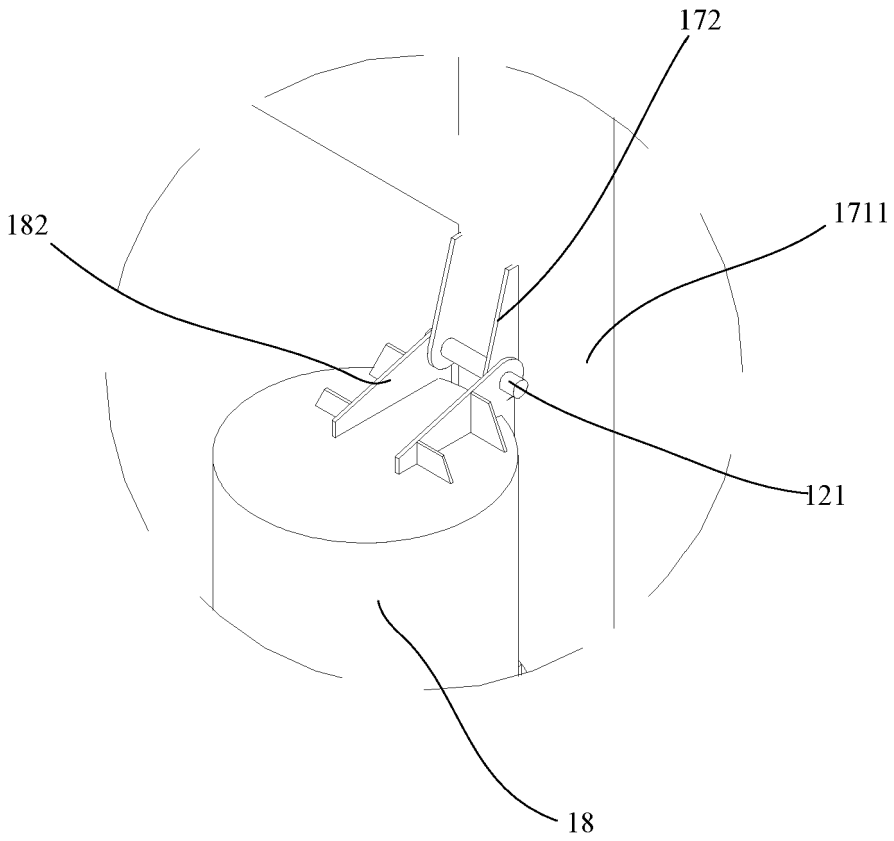

FIG. 2

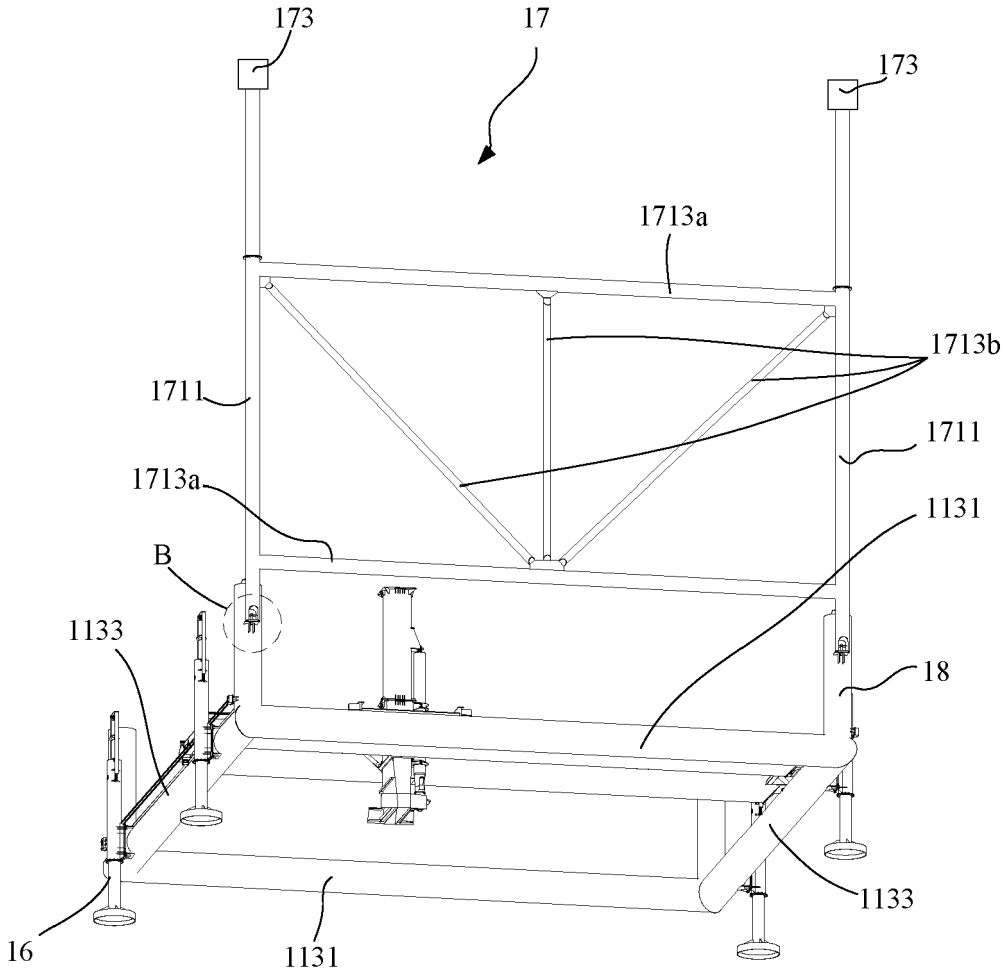
173
17
173
1713a
1713b
1711
1711
1713a
1131
B
1133
18
1133
16
1131

FIG. 3

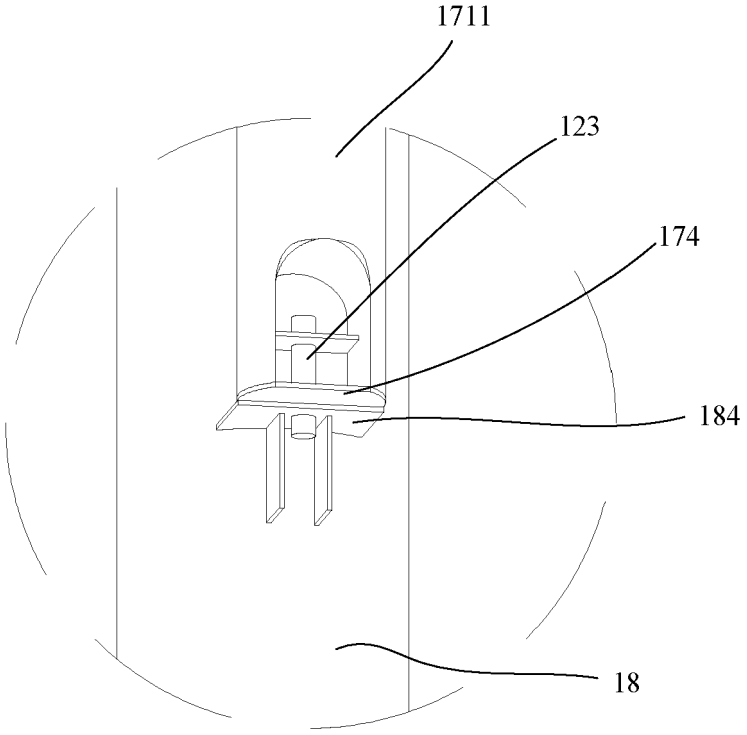

FIG. 4

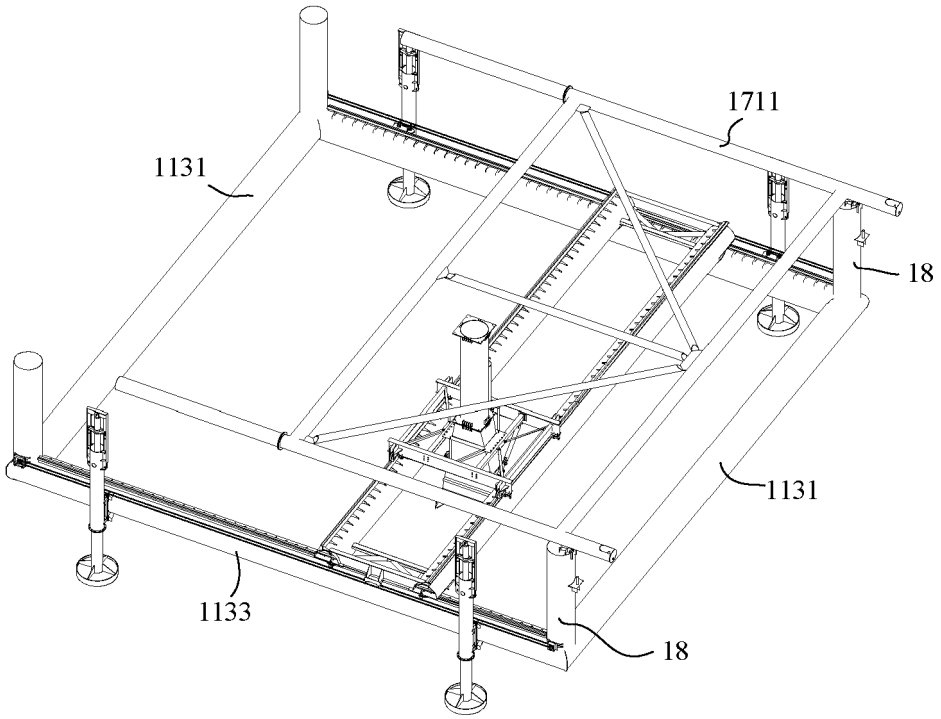

FIG. 5

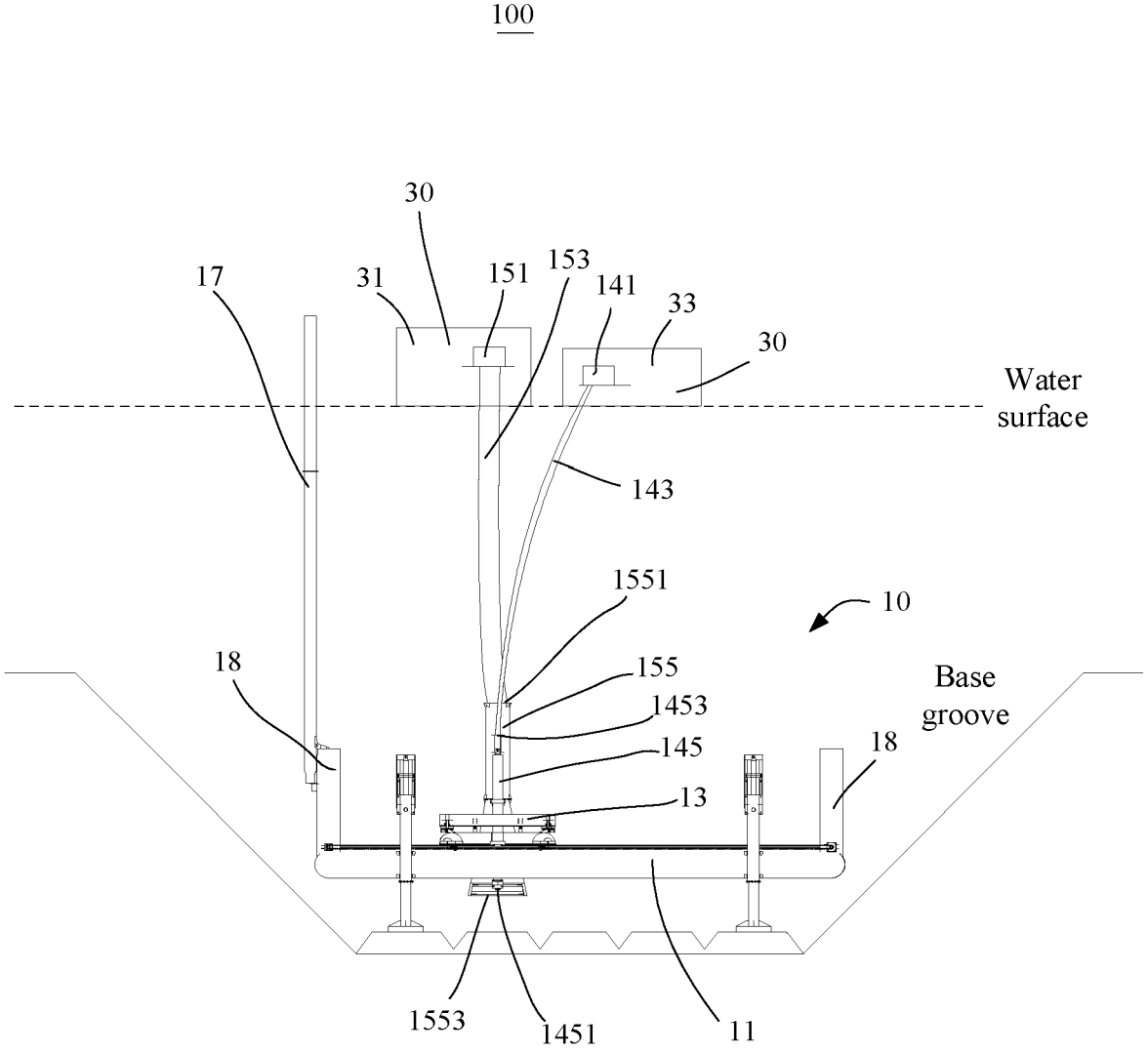
100
30
17
31
151
153
141
33
30
Water surface
143
1551
10
18
155
1453
Base groove
145
18
13
1553
1451
11

FIG. 6

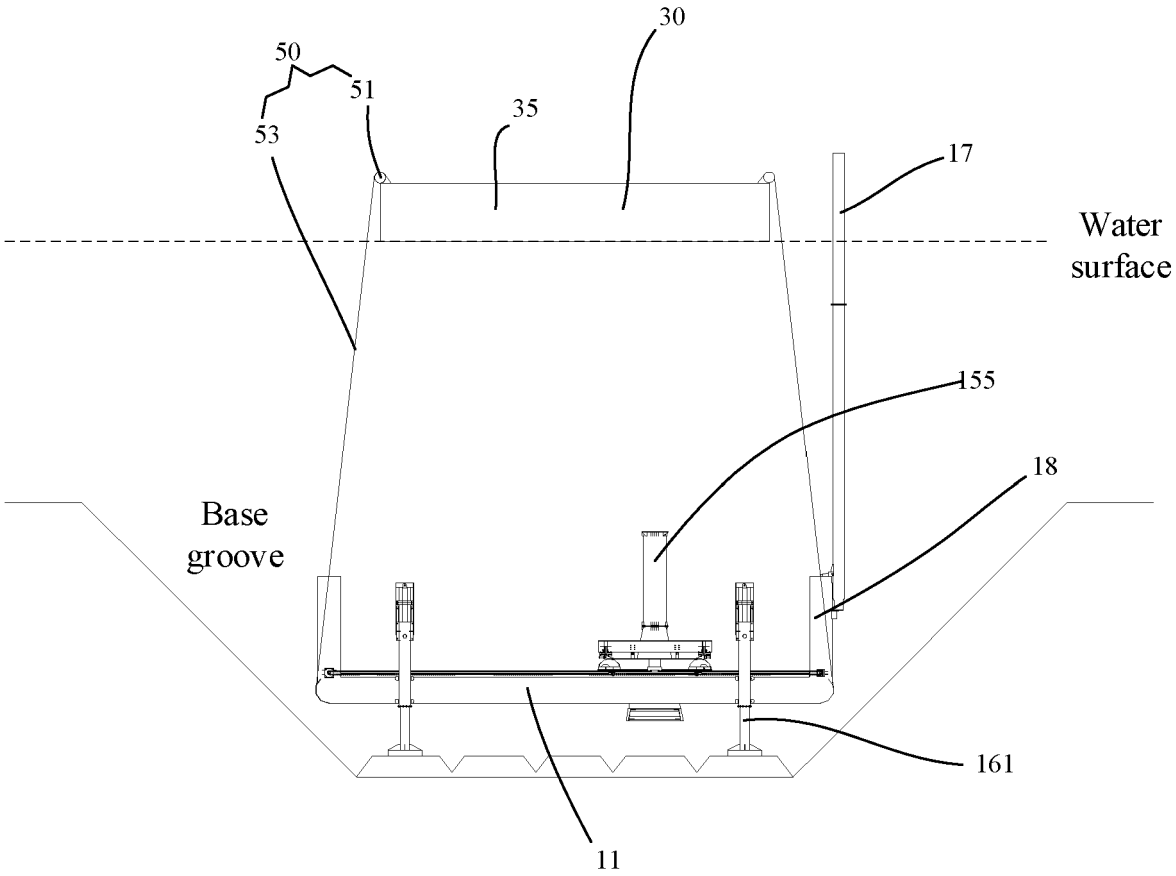

FIG. 7

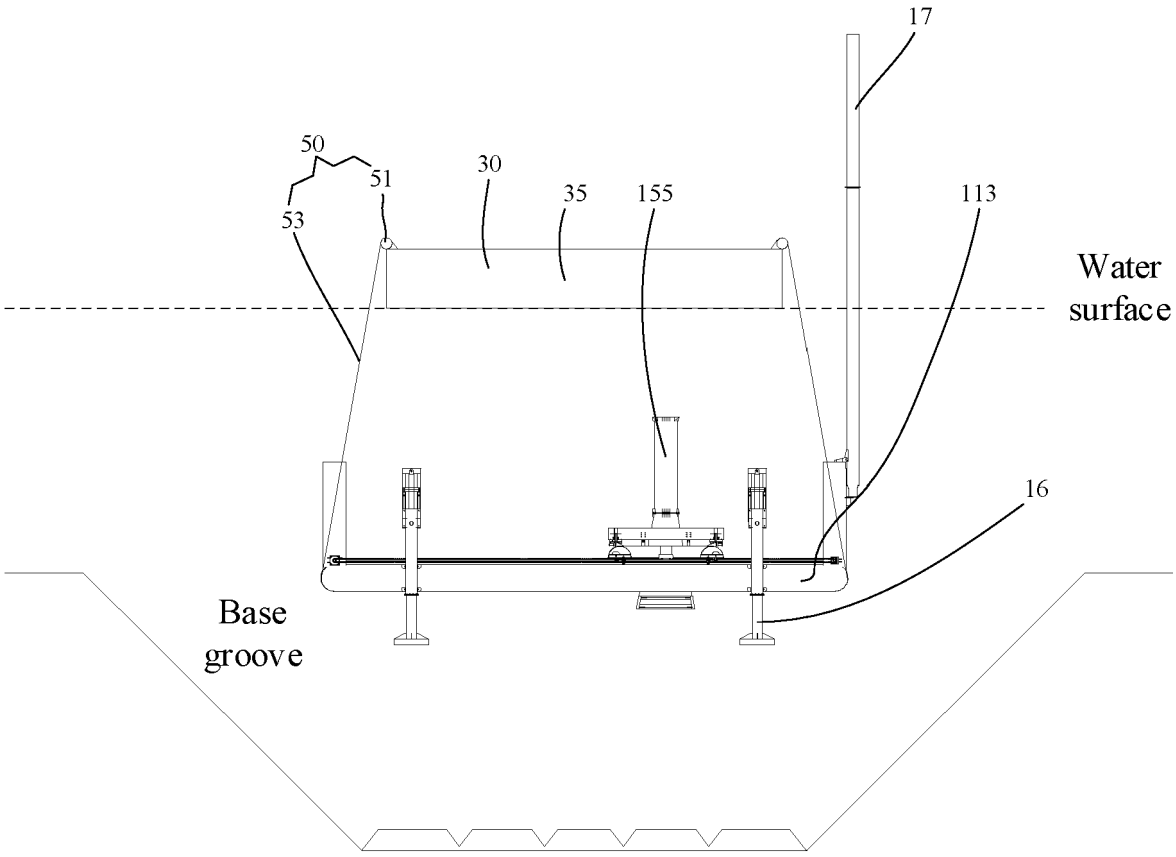

FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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