

FLUID LAYING DEVICE, FLOOR TILE LAYING ROBOT AND SLURRY LAYING METHOD

TECHNICAL FIELD

5 The present application relates to the technical field of construction equipment and, in particular, to a fluid laying device, a floor tile laying robot, and a slurry laying method.

BACKGROUND

At present, when floor tiles are laid, a layer of adhesive fluid needs to be laid on a paving surface to effectively bond the tiles and the paving surface together. Generally, the adhesive fluid is manually spread on the paving surface, and then the fluid is scraped into a straight surface with a scraper. Due to the influence of the worker's proficiency factor, it is easy to cause the laid slurry surface to be out of line. After the tiles are laid, it is easy to cause the lack of slurry under the tiles, leading to the quality problem of empty drum tiles. In addition, the method of manual scraping for the straight surface has high technical requirements for the worker and features high labor intensity, which is not conducive to improving the efficiency of the slurry laying operation.

SUMMARY

According to various embodiments of the present application, a fluid laying device, a floor tile laying robot, and a slurry laying method are provided.

20 A fluid laying device in an embodiment of the present application includes a chassis, a translation deviation correction mechanism, a slurry laying mechanism, and a slurry supply mechanism.

The translation deviation correction mechanism is disposed on the chassis and includes a movable base configured to move in a direction perpendicular to a laying direction of fluid and a deviation correction detection member disposed on the movable base.

25 The slurry laying mechanism is connected to the movable base.

The slurry supply mechanism is disposed on the chassis to supply the fluid to the slurry laying mechanism.

When the fluid laying device works, the deviation correction detection member controls the movable base according to received laser rays so that the slurry laying mechanism performs slurry laying linearly along the laying direction.

5 In an embodiment, the translation deviation correction mechanism further includes a drive member and a movement assembly.

The drive member is disposed on the movable base.

The movement assembly includes a moving part and a guide support connected to the moving part, where the moving part is connected to the drive member, and the guide support is connected to the chassis.

10 In an embodiment, the drive member is a first drive motor; the moving part is a lead screw, where the lead screw is connected to an output end of the first drive motor; and the guide support is a nut, where the nut is fitted on the lead screw, and the nut is connected to the chassis.

In an embodiment, the fluid laying device further includes an up-down leveling mechanism.

15 The up-down leveling mechanism is disposed between the movable base and the slurry laying mechanism and includes a lifter and a leveling detection member, where the lifter is disposed on the movable base, an output end of the lifter is drivingly connected to the slurry laying mechanism, and the leveling detection member is disposed on the movable base.

20 When the fluid laying device works, the leveling detection member controls the lifter to ascend and descend according to the received laser rays so that a bottom of the slurry laying mechanism is kept parallel to a construction surface.

In an embodiment, the lifter includes a third motor and a linear electric cylinder, where the third motor is drivingly connected to the linear electric cylinder to drive the linear electric cylinder to stretch out and draw back, and a telescopic rod of the linear electric cylinder is drivingly connected to the slurry laying mechanism.

25 In an embodiment, the up-down leveling mechanism further includes a rotating member, where the rotating member is disposed on the movable base and rotatable around a vertical axis, an output end of the rotating member is drivingly connected to the leveling detection member, and the rotating member is capable of adjusting a detection direction of the leveling detection

member.

5 In an embodiment, two up-down leveling mechanism are provided, where the two up-down leveling mechanisms are correspondingly disposed at two ends of the slurry laying mechanism in a length direction of the slurry laying mechanism to adjust heights of the two ends of the slurry laying mechanism respectively.

In an embodiment, the up-down leveling mechanism further includes a linear guide rail, where the linear guide rail is drivingly connected to the output end of the lifter, a slider of the linear guide rail is connected to the movable base, and the linear guide rail is connected to the slurry laying mechanism.

10 In an embodiment, the slurry laying mechanism includes a slurry box and a toothed scraper.

A slurry outlet is provided below the slurry box.

The toothed scraper is disposed on the slurry outlet and extends in a length direction of the slurry box.

15 In an embodiment, the slurry supply mechanism includes a slurry hopper, a screw delivery rod, a delivery pipe, and a second drive motor.

The slurry hopper is disposed on the chassis.

The screw delivery rod is pivotally disposed in the slurry hopper.

20 The delivery pipe is disposed on the slurry hopper, where one end of the delivery pipe is communicated with a delivery end of the screw delivery rod and the other end of the delivery pipe is communicated with the slurry box.

An output end of the second drive motor is drivingly connected to the screw delivery rod.

25 In an embodiment, a chain transmission mechanism is disposed between the second drive motor and the screw delivery rod and includes a transmission chain and two sprockets, where the two sprockets are drivingly connected to the output end of the second drive motor and the screw delivery rod respectively, and the transmission chain is sleeved on the two sprockets.

In an embodiment, the chassis includes a chassis body, a moving wheel, and a control cabinet.

The moving wheel is disposed below the chassis body.

The control cabinet is disposed below the chassis body.

5 In an embodiment, the chassis further includes a power supply system, where the power supply system is disposed above the chassis body and configured to supply power to the moving wheel to drive the chassis body to move.

In an embodiment, the fluid laying device further includes a guiding mechanism, where the guiding mechanism is disposed between the movable base and the chassis and includes a slide rail and a moving slider, where the slide rail is disposed on the chassis, and the moving slider is fitted on the slide rail and connected to the movable base.

10 A floor tile laying robot includes the preceding fluid laying device.

A slurry laying method includes the preceding fluid laying device.

The slurry laying method includes the steps described below.

15 The chassis moves along a slurry laying direction, the slurry supply mechanism delivers the fluid to the slurry laying mechanism, and the slurry laying mechanism lays the slurry on the construction surface.

The deviation correction detection member controls the translation deviation correction mechanism according to the received laser rays to adjust a horizontal position of the slurry laying mechanism so as to perform slurry laying linearly along the laying direction.

In an embodiment, the slurry laying method further includes the step described below.

20 The leveling detection member controls the up-down leveling mechanism according to the laser rays to adjust a height of the slurry laying mechanism so that the bottom of the slurry laying mechanism is kept parallel to the construction surface.

25 Details of one or more embodiments of the present application are set forth in the drawings and description below. Other features, objects and advantages of the present application become apparent from the description, drawings and claims.

BRIEF DESCRIPTION OF DRAWINGS

To better describe and illustrate those embodiments and/or examples of the present application disclosed herein, reference may be made to one or more of drawings. Additional details or examples for describing the drawings should not be considered to limit the scope of any of the disclosed application, the currently described embodiments and/or examples, or the best mode of those applications currently understood.

FIG. 1 is a perspective view of a fluid laying device according to an embodiment of the present application;

FIG. 2 is a partial perspective view of a fluid laying device according to an embodiment of the present application;

FIG. 3 is a perspective view of a slurry supply mechanism according to an embodiment of the present application;

FIG. 4 is a perspective view illustrating assembly of a chassis and a slurry supply mechanism according to an embodiment of the present application;

FIG. 5 is a structural view of a fluid laying device cooperating with a laser generator according to an embodiment of the present application;

FIG. 6 is a schematic view of a fluid laying device with a slurry laying mechanism kept parallel to a construction surface according to an embodiment of the present application;

FIG. 7 is schematic view one illustrating a fluid laying device with a slurry laying mechanism inclined to the left according to an embodiment of the present application;

FIG. 8 is schematic view two illustrating a fluid laying device with a slurry laying mechanism inclined to the left according to an embodiment of the present application;

FIG. 9 is schematic view one illustrating a fluid laying device with a slurry laying mechanism inclined to the right according to an embodiment of the present application;

FIG. 10 is schematic view two illustrating a fluid laying device with a slurry laying mechanism inclined to the left according to an embodiment of the present application;

FIG. 11 is a schematic view of a slurry laying mechanism with a fluid laying device not deviated according to an embodiment of the present application;

FIG. 12 is a schematic view of a slurry laying mechanism with a fluid laying device deviating to the left according to an embodiment of the present application; and

5 FIG. 13 is a schematic view of a slurry laying mechanism with a fluid laying device deviating to the right according to an embodiment of the present application.

Reference list

	100	fluid laying device
	10	chassis
10	11	chassis body
	12	moving wheel
	13	power supply system
	14	control cabinet
	15	universal wheel
15	20	translation deviation correction mechanism
	21	first drive motor
	22	lead screw
	23	movable base
	231	connecting plate
20	24	deviation correction detection member
	25	nut

	26	lead screw support base
	27	coupling
	28	first mount
	29	nut fixing base
5	30	slurry laying mechanism
	31	slurry box
	32	toothed scraper
	40	slurry supply mechanism
	41	slurry hopper
10	42	screw delivery rod
	43	delivery pipe
	44	second drive motor
	45	transmission chain
	46	sprocket
15	47	reducer
	50	up-down leveling mechanism
	51	lifter
	511	third motor
	512	linear electric cylinder
20	52	rotating member

	53	leveling detection member
	54	linear guide rail
	55	pin shaft
	56	connecting rod
5	60	guiding mechanism
	61	slide rail
	62	moving slider
	200	laser generator
	300	construction surface
10	O2	horizontal laser rays
	O1	vertical laser rays

DETAILED DESCRIPTION

Embodiments of the present application are described in detail below, and examples of the
embodiments are illustrated in the drawings, where the same or similar reference numerals
15 indicate the same or similar elements or elements having the same or similar functions. The
embodiments described below with reference to the drawings are illustrative, only for
explaining the present application, and not to be construed as limiting the present application.

In the description of the present application, it is to be understood that the orientation or
position relationships indicated by terms "center", "longitudinal", "lateral", "length", "width",
20 "up", "down", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inside",
"outside", "axial", "radial", and "circumferential" are based on the orientation or position
relationships shown in the drawings, merely for facilitating description of the present
application and simplifying description, and do not indicate or imply that the apparatus or
element referred to has a specific orientation and is constructed and operated in a specific
25 orientation, and thus it is not to be construed as limiting the present application. In addition, a

feature defined as a "first" feature or a "second" feature may explicitly or implicitly include one or more of such features to distinguish and describe the features regardless of order or weight. In the description of the present application, unless otherwise noted, the term "a plurality of" or "multiple" means two or more.

5 In the description of the present application, it is to be noted that unless otherwise expressly specified and limited, the term "mounted", "connected to each other" or "connected" should be construed in a broad sense as securely connected, detachably connected or integrally connected; mechanically connected or electrically connected; directly connected to each other or indirectly connected to each other via an intermediary; or intraconnected between two components. For
10 those of ordinary skill in the art, specific meanings of the preceding terms in the present application may be construed according to specific circumstances.

A fluid laying device 100 in the embodiments of the present application is described below with reference to the drawings.

As shown in FIG. 1, the fluid laying device 100 in an embodiment of the present application is
15 used in conjunction with a laser generator 200 and includes a chassis 10, a translation deviation correction mechanism 20, a slurry laying mechanism 30, and a slurry supply mechanism 40.

The translation deviation correction mechanism 20 is disposed on the chassis 10 and includes a movable base 23 configured to move in a direction perpendicular to a laying direction of fluid and a deviation correction detection member 24 disposed on the movable base 23. The slurry
20 laying mechanism 30 is connected to the movable base 23. The slurry supply mechanism 40 is disposed on the chassis 10 to supply the fluid to the slurry laying mechanism 30. It is to be understood that the slurry laying mechanism 30 is disposed at a front end of the chassis 10. When the fluid laying device 100 works, the slurry supply mechanism 40 supplies the fluid to the slurry laying mechanism 30, the chassis 10 drives the fluid laying device 100 to linearly
25 move as a whole, and the slurry laying mechanism 30 performs a slurry laying operation on a construction surface 300.

As shown in FIG. 5, when the fluid laying device 100 works, the deviation correction detection member 24 controls the movable base 23 according to received laser rays so that the slurry laying mechanism 30 performs slurry laying linearly along the laying direction. That is to say,
30 when the slurry laying mechanism 30 works normally, a position of vertical laser rays O1 emitted by the laser generator 200 and received by the deviation correction detection member

24 is a vertical zero position; and the movable base 23 is configured to drive the slurry laying mechanism 30 to move so that the position of the vertical laser rays O1 received by the deviation correction detection element 24 can return to the vertical zero position. For example, in a process of laying tiles, the slurry laying mechanism 30 performs slurry laying linearly when working normally. Due to the influence of the operator's proficiency factor, the chassis 10 easily deviate from a slurry laying direction. For example, the slurry laying mechanism 30 deviates from the laying direction of the fluid to the left or the right (as shown in FIGS. 12 and 13), so that the linear slurry laying operation cannot be kept. When the position of the vertical laser rays O1 emitted by the laser generator 200 and received by the deviation correction detection member 24 is not at the vertical zero position, the translation deviation correction mechanism 20 is started, and the movable base 23 drives the slurry laying mechanism 30 to move in a direction perpendicular to a movement direction of the chassis 10, thereby adjusting the position of the slurry laying mechanism 30 so that the position of the vertical laser rays O1 received by the deviation correction detection member 24 returns to the vertical zero position, and thereby ensuring that a slurry surface laid by the slurry laying mechanism 30 is in a straight line. Optionally, the deviation correction detection member 24 may directly control the movable base 23 according to the received laser rays. Alternatively, a controller (not shown) is provided in the fluid laying device 100, the deviation correction detection member 24 converts the received laser rays into an electrical signal and transmits the electrical signal to the controller, and the controller controls the movable base 23 according to the electrical signal.

In the fluid laying device 100 in the embodiment of the present application, the vertical laser rays O1 is used as a reference parallel to a floor tile edge line, and the deviation correction detection member 24 receives a signal of laser rays parallel to the floor tile edge line to control the translation deviation correction mechanism 20 to perform deviation correction on the slurry laying mechanism 30 in the horizontal direction. Due to ground flatness, sundries (such as gravel) and other reasons, the existing slurry laying robot cannot move along a straight line, and slurry laying cannot be performed linearly. In the present application, it can be ensured that a laid slurry surface is linearly laid, and manual work can be replaced to complete laying of an adhesive fluid, thereby avoiding a quality problem caused by nonstandard manual operation, reducing the labor intensity of workers and improving the slurry laying efficiency.

In some embodiments, the deviation correction detection member 24 is a photoelectric position sensitive sensor.

In some embodiments, as shown in FIG. 2, the translation deviation correction mechanism 20

includes a drive member and a movement assembly. The drive member is disposed on the movable base 23. The movement assembly includes a moving part and a guide support connected to the moving part, where the moving part is drivingly connected to the drive member, and the guide support is connected to the chassis 10.

5 Specifically, the drive member is a first drive motor 21. The moving part is a lead screw 22, where the lead screw 22 is drivingly connected to an output end of the first drive motor 21. The guide support is a nut 25, where the nut 25 is fitted on the lead screw 22, and the nut 25 is connected to the chassis 10. When the translation deviation correction mechanism 20 works, the first drive motor 21 is started to drive the lead screw 22 to rotate, the lead screw 22 generates a thrust to the nut 25, and a reaction force applied by the nut 25 to the lead screw 22 drives the
10 movable base 23 to perform translational movement, thereby driving the slurry laying mechanism 30 to move horizontally to achieve translation correction. Since both the deviation correction detection member 24 and the slurry laying mechanism 30 are disposed on the movable base 23, the deviation correction detection member 24 can visually reflect the position
15 of the slurry laying mechanism 30 by receiving the vertical laser rays O1 emitted by the laser generator 200, and the deviation correction detection member 24 moves on the movable base 23 along with the slurry laying mechanism 30 and can detect in real time whether the slurry laying mechanism 30 is in place after deviation correction.

Optionally, as shown in FIG. 2, a lead screw support base 26 is pivotally disposed at the other
20 end of the lead screw 22 and connected to the movable base 23 so that the connection reliability between the lead screw 22 and the movable base 23 is enhanced, and a process in which the lead screw 22 drives the movable base 23 to move is more stable. One end of the lead screw 22 is drivingly connected to an output shaft of the first drive motor 21 through a coupling 27, thereby facilitating the installation of the lead screw 22 and the first drive motor 21.

25 Optionally, the lead screw 22 is a ball screw. Of course, the lead screw 22 in the present application is not limited thereto. Another type of lead screw such as triangular thread, trapezoidal thread, rectangular thread or serrated thread may also be used.

Optionally, as shown in FIG. 2, the first drive motor 21 is a servo motor, the first drive motor 21 is connected to a first mount 28, and the first mount 28 is fixed on the movable base 23, thereby
30 facilitating the installation of the first drive motor 21.

Optionally, as shown in FIG. 2, the nut 25 is connected to a nut fixing base 29, and the nut

fixing base 29 is connected to the chassis 10, thereby facilitating the installation of the nut 25 and improving the connection reliability between the nut 25 and the chassis 10.

Optionally, as shown in FIG. 2, the movable base 23 is provided with a connecting plate 231, and the deviation correction detection member 24 is disposed on the connecting plate 231.

- 5 In some embodiments, the translation deviation correction mechanism 20 includes a translation mechanism in which a gear (not shown) drives a rack (not shown) to linearly move. For example, the first drive motor 21 drives the gear to rotate, and the gear meshes with the rack to drive the rack to move. The slurry laying mechanism 30 is connected to the rack, which also achieves horizontal movement for deviation correction.
- 10 In some embodiments, as shown in FIG. 4, a guiding mechanism 60 is disposed between the movable base 23 and the chassis 10. The guiding mechanism 60 includes a slide rail 61 and a moving slider 62. The slide rail 61 is disposed on the chassis 10 in a width direction of the chassis 10. The moving slider 62 is fitted on the slide rail 61 and connected to the movable base 23. When the movable base 23 moves horizontally, with the slide rail 61 and the moving slider 62, stable translation of the movable base 23 on the chassis 10 can be ensured, thereby
- 15 62, stable translation of the movable base 23 on the chassis 10 can be ensured, thereby improving the movement reliability.

In some embodiments, as shown in FIG. 4, multiple moving sliders 62 are arranged at intervals on the slide rail 61. For example, two moving sliders 62 are provided.

- 20 In some embodiments, as shown in FIGS. 1 and 2, the fluid laying device 100 further includes an up-down leveling mechanism 50 disposed between the movable base 23 and the slurry laying mechanism 30 to adjust heights of two ends of the slurry laying mechanism 30 in a length direction of the slurry laying mechanism 30. The up-down leveling mechanism 50 includes a lifter 51 and a leveling detection member 53. The lifter 51 is disposed on the movable base 23, an output end of the lifter 51 is drivingly connected to the slurry laying mechanism 30, and the
- 25 leveling detection member 53 is disposed on the movable base 23. When up-down leveling is performed, the lifter 51 ascends to increase a height of an end of the slurry laying mechanism 30 relative to the construction surface 300, and the lifter 51 descends to decrease the height of the end of the slurry laying mechanism 30 relative to the construction surface 300.

- 30 When the fluid laying device 100 works, the leveling detection member 53 controls the lifter 51 to ascend and descend according to the received laser rays so that a bottom of the slurry laying

mechanism 30 is kept parallel to the construction surface. Specifically, the bottom of the slurry laying mechanism 30 refers to a bottom edge of the toothed scraper 32. That is to say, when the fluid laying device 100 works normally, a position of horizontal laser rays O2 emitted by the laser generator 200 and received by the leveling detection member 53 is a horizontal zero position; the up-down leveling mechanism 50 is configured to drive the slurry laying mechanism 30 to ascend and descend so that the position of the horizontal laser rays O2 received by the leveling detection member 53 can return to the horizontal zero position. In a process of laying tiles, when the slurry laying mechanism 30 works normally, the bottom of the slurry laying mechanism 30 is kept parallel to the construction surface 300. Due to the influence of the unevenness of a laying surface, the laid slurry surface is uneven. When the position of the horizontal laser rays O2 emitted by the laser generator 200 and received by the leveling detection member 53 is not at the horizontal zero point, the up-down leveling mechanism 50 is started to adjust the heights of the two ends of the slurry laying mechanism 30 so that the bottom of the slurry laying mechanism 30 is kept parallel to the construction surface 300, thereby ensuring that the laid slurry surface is even in height. The horizontal laser rays O2 emitted by the laser generator 200 is used as a horizontal plane elevation reference, and the leveling detection member 53 receives a signal of the horizontal plane elevation reference to control the up-down leveling mechanism 50, so as to solve the quality problem of the unevenness of the laid slurry surface caused by the unevenness of the construction surface 300. Optionally, the deviation correction detection member 24 may directly control the lifter 51 according to the received laser rays. Alternatively, a controller (not shown) is provided in the fluid laying device 100, the deviation correction detection member 24 converts the received laser rays into an electrical signal and transmits the electrical signal to the controller, and the controller controls the lifter 51 according to the electrical signal. Optionally, the leveling detection member 53 is a photoelectric position sensitive sensor.

Optionally, as shown in FIG. 2, two up-down leveling mechanisms 50 are provided, and the two up-down leveling mechanisms 50 are correspondingly disposed at the two ends of the slurry laying mechanism 30 along the length direction of the slurry laying mechanism 30 to adjust the heights of the two ends of the slurry laying mechanism 30 respectively. That is to say, the two up-down leveling mechanisms 50 can independently adjust the heights of the two ends of the slurry laying mechanism 30. For example, as shown in FIGS. 7 and 8, when the construction surface 300 at a left end of the slurry laying mechanism 30 is relatively high, the up-down leveling mechanism 50 at the left end raises the slurry laying mechanism 30; and when the

construction surface 300 at the left end of the slurry laying mechanism 30 is relatively low, the up-down leveling mechanism 50 at the left end lowers the slurry laying mechanism 30. As shown in FIGS. 9 and 10, when the construction surface 300 at a right end of the slurry laying mechanism 30 is relatively high, the up-down leveling mechanism 50 at the right end raises the slurry laying mechanism 30; and when the construction surface 300 at the right end of the slurry laying mechanism 30 is relatively low, the up-down leveling mechanism 50 at the right end lowers the slurry laying mechanism 30. It is to be understood that the two up-down leveling mechanisms 50 are correspondingly disposed at the two ends of the slurry laying mechanism 30 along the length direction of the slurry laying mechanism 30. The "two ends" here may refer to the utmost edge end of the slurry laying mechanism 30 along the length direction or may also refer to a region within a certain reasonable range near the utmost edge end of the slurry laying mechanism 30 along the length direction. The "two ends" in the heights of the two ends of the slurry laying mechanism 30 refers to the utmost edge end of the slurry laying mechanism 30 along the length direction.

In some embodiments, as shown in FIG. 2, the lifter 51 includes a third motor 511 and a linear electric cylinder 512, where the third motor 511 is connected to the linear electric cylinder 512 to drive the linear electric cylinder 512 to stretch out and draw back, and a telescopic rod of the linear electric cylinder 512 is connected to the slurry laying mechanism 30.

Optionally, as shown in FIG. 2, the up-down leveling mechanism 50 further includes a rotating member 52, where the rotating member 52 is disposed on the movable base 23 and rotatable around a vertical axis, an output end of the rotating member 52 is drivingly connected to the leveling detection member 53, and the rotating member 52 is capable of adjusting a detection direction of the leveling detection member 53. The rotating member 52 drives the leveling detection member 53 to rotate to an optimal angle so as to be aligned with the horizontal laser rays O2 emitted by the laser generator 200.

Optionally, the rotating member 52 is a steering gear, where an output end of the steering gear is drivingly connected to the leveling detection member 53, and the steering gear is used to conveniently and accurately control a rotation angle of the leveling detection member 53. Of course, the rotating member 52 may also be a stepper motor or a rotating cylinder, which is not repeated here.

In some embodiments, as shown in FIG. 2, the up-down leveling mechanism 50 further includes a linear guide rail 54, where the linear guide rail 54 is connected to the output end of the lifter

51, a slider of the linear guide rail 54 is connected to the movable base 23, and the linear guide rail 54 is connected to the slurry laying mechanism 30 through a pin shaft 55. That is to say, the linear guide rail 54 can play a guiding role, and the lifter 51 has better stability when driving the slurry laying mechanism 30 to ascend and descend.

- 5 In some embodiments, as shown in FIG. 2, an upper end of the linear guide rail 54 is drivingly connected to the output end of the lifter 51 through a connecting rod 56.

In some embodiments, as shown in FIG. 2, the slurry laying mechanism 30 includes a slurry box 31 and a toothed scraper 32. A slurry outlet (not shown) is provided below the slurry box 31. The toothed scraper 32 is disposed on the slurry outlet and extends in a length direction of the
10 slurry box 31. That is to say, the slurry in the slurry box 31 reaches the toothed scraper 32 through the slurry outlet, and the slurry is scraped by the toothed scraper 32 into a straight toothed surface.

Optionally, as shown in FIG. 3, the slurry supply mechanism 40 includes a slurry hopper 41, a screw delivery rod 42, a delivery pipe 43, and a second drive motor 44. The slurry hopper 41 is
15 disposed on the chassis 10. The screw delivery rod 42 is pivotally disposed in the slurry hopper 41. The delivery pipe 43 is disposed on the slurry hopper 41, where one end of the delivery pipe 43 is communicated with a delivery end of the screw delivery rod 42 and the other end of the delivery pipe 43 is communicated with the slurry box 31. An output end of the second drive motor 44 is drivingly connected to the screw delivery rod 42. It is to be understood that the
20 screw delivery rod 42 is disposed at a bottom of the slurry hopper 41, the second drive motor 44 drives the screw delivery rod 42 to rotate, the slurry in the slurry hopper 41 is discharged to the delivery end along with the screw delivery rod 42, and then the slurry reaches the slurry box 31 through the delivery pipe 43, thereby achieving the feeding of the slurry laying mechanism 30.

Optionally, as shown in FIG. 3, a chain transmission mechanism is disposed between the second
25 drive motor 44 and the screw delivery rod 42 and includes a transmission chain 45 and two sprockets 46, where the two sprockets 46 are drivingly connected to an output shaft of the second drive motor 44 and the screw delivery rod 42 respectively, and the transmission chain 45 is sleeved on the two sprockets 46. The second drive motor 44 is started to drive the sprocket 46 on the second drive motor 44 to rotate, and then the transmission chain 45 drives the other
30 sprocket 46 to rotate, thereby driving the screw delivery rod 42 to rotate.

Optionally, as shown in FIG. 3, the second drive motor 44 is a servo motor, and a reducer 47 is

disposed between the second drive motor 44 and the sprocket 46.

5 In some embodiments, as shown in FIG. 4, the chassis 10 includes a chassis body 11, a power supply system 13, a moving wheel 12, and a control cabinet 14. The slurry supply mechanism 40 is disposed above the chassis body 11 and on one side of the chassis body 11 in a width direction of the chassis body 11. The power supply system 13 is disposed above the chassis body 11 and on the other side of the chassis body 11 along the width direction, and the power supply system 13 is disposed in a length direction of the chassis body 11. In this manner, the layout of the slurry supply mechanism 40 and the power supply system 13 in the chassis body 11 is compact, which is conducive to reducing a volume of an upper space of the entire chassis body 11. The moving wheel 12 is disposed below the chassis body 11, and the power supply system 13 supplies electric power to the moving wheel 12 to drive the chassis body 11 to move. The control cabinet 14 is disposed below the chassis body 11, so as to save an upper space of the chassis 11.

15 Optionally, as shown in FIG. 4, the moving wheel 12 is a steering wheel, and the chassis 10 further includes a universal wheel 15 disposed below the chassis body 11.

A specific embodiment of the fluid laying device 100 in the present application is described below with reference to the drawings.

20 As shown in FIGS. 1 to 4, a fluid laying device 100 is used in conjunction with a laser generator 200 and includes a chassis 10, a translation deviation correction mechanism 20, a slurry laying mechanism 30, a slurry supply mechanism 40, and an up-down leveling mechanism 50.

The translation deviation correction mechanism 20 is disposed on the chassis 10 and includes a movable base 23 configured to move in a direction perpendicular to the fluid laying direction and a deviation correction detection member 24 disposed on the movable base 23.

25 The translation deviation correction mechanism 20 includes a first drive motor 21, a lead screw 22, a movable base 23, a deviation correction detection member 24, and a nut 25. The first drive motor 21 is disposed on the movable base 23. One end of the lead screw 22 is drivingly connected to an output end of the first drive motor 21. The nut 25 is fitted on the lead screw 22, the nut 25 is connected to the chassis 10, and the deviation correction detection member 24 is a photoelectric position sensitive sensor.

The other end of the lead screw 22 is pivotally provided with the lead screw support base 26. The one end of the lead screw 22 is drivingly connected to an output shaft of the first drive motor 21 through a coupling 27. The lead screw 22 is a ball screw. The first drive motor 21 is a servo motor. The first drive motor 21 is connected to the first mount 28. The first mount 28 is disposed on the movable base 23. The nut 25 is connected to the nut fixing base 29. The nut fixing base 29 is connected to the chassis 10. The movable base 23 is provided with a connecting plate 231. The deviation correction detection member 24 is disposed on the connecting plate 231.

The slurry laying mechanism 30 is connected to the movable base 23. The slurry laying mechanism 30 includes a slurry box 31 and a toothed scraper 32. The slurry outlet (not shown) is provided below the slurry box 31. The toothed scraper 32 is disposed in the length direction of the slurry box 31, and the toothed scraper 32 is disposed on the slurry outlet.

The slurry supply mechanism 40 is disposed on the chassis 10 to supply the slurry to the slurry laying mechanism 30.

The slurry supply mechanism 40 includes a slurry hopper 41, a screw delivery rod 42, a delivery pipe 43, and a second drive motor 44. The slurry hopper 41 is disposed on the chassis 10. The screw delivery rod 42 is pivotally disposed in the slurry hopper 41. The delivery pipe 43 is disposed on the slurry hopper 41, where one end of the delivery pipe 43 is communicated with the delivery end of the screw delivery rod 42 and the other end of the delivery pipe 43 is communicated with the slurry box 31. The output end of the second drive motor 44 is drivingly connected to the screw delivery rod 42.

A chain transmission mechanism is disposed between the second drive motor 44 and the screw delivery rod 42 and includes a transmission chain 45 and two sprockets 46, where the two sprockets 46 are drivingly connected to an output shaft of the second drive motor 44 and the screw delivery rod 42 respectively, and the transmission chain 45 is sleeved on the two sprockets 46.

The second drive motor 44 is a servo motor, and a reducer 47 is disposed between the second drive motor 44 and the sprocket 46.

The up-down leveling mechanism 50 is disposed between the movable base 23 and the slurry laying mechanism 30. The up-down leveling mechanism 50 includes a leveling detection

member 53, where the leveling detection member 53 is a photoelectric position sensitive sensor. Two up-down leveling mechanisms 50 are provided and correspondingly disposed at two ends of the slurry laying mechanism 30 in the length direction.

Each up-down leveling mechanism 50 includes a lifter 51, a rotating member 52, a leveling
5 detection member 53, and a linear guide rail 54. The lifter 51 is disposed on the movable base 23 and includes a third motor 511 and a linear electric cylinder 512, where the third motor 511 is connected to the linear electric cylinder 512 to drive the linear electric cylinder 512 to stretch out and draw back, and a telescopic rod of the linear electric cylinder 512 is connected to the slurry laying mechanism 30. The rotating member 52 is a steering gear, where an output end of
10 the steering gear is drivingly connected to the leveling detection member 53. The linear guide rail 54 is connected to an output end of the lifter 51, a slider of the linear guide rail 54 is connected to the movable base 23, and the linear guide rail 54 is connected to the slurry laying mechanism 30 through a pin shaft 55. An upper end of the linear guide rail 54 is drivingly connected to the output end of the lifter 51 through a connecting rod 56.

15 The chassis 10 includes a chassis body 11, a moving wheel 12, a power supply system 13, and a control cabinet 14. The slurry supply mechanism 40 is disposed above the chassis body 11 and on one side of the chassis body 11 along the width direction of the chassis body 11. The power supply system 13 is disposed above the chassis body 11 and on the other side of the chassis body 11 along the width direction, and the power supply system 13 is disposed along the length
20 direction of the chassis body 11. The moving wheel 12 is disposed below the chassis body 11. The control cabinet 14 is disposed below the chassis body 11, the moving wheel 12 is a steering wheel, and the chassis 10 further includes an universal wheel 15 disposed below the chassis body 11.

A working method of the present application is described below.

25 As shown in FIG. 5, the laser generator 200 and the chassis 10 are placed in positions shown in the figure, the horizontal laser rays O2 and the vertical laser rays O1 are turned on, the slurry hopper 41 of the slurry supply mechanism 40 is filled with the slurry, the second drive motor 44 is started to drive the reducer 47 to rotate, and then drive the screw delivery rod 42 to rotate through the transmission of the sprockets 46 and the transmission chain 45, the screw delivery
30 rod 42 delivers the slurry to the slurry box 31 through the delivery pipe 43, and the toothed scraper 32 mounted on the slurry outlet draws the slurry to form a toothed surface.

The power supply system 13 of the chassis 10 supplies power, the control cabinet 14 provides control programs to drive the moving wheel 12 to drive the chassis body 11 to move, and the slurry laying mechanism 30 mounted on the linear guide rail 54 also moves with the chassis 10. Of course, in other embodiments, power may also be directly supplied to the fluid laying device 100 through a commercial power system.

As shown in FIG. 6, when the ground is horizontal, the chassis 10 and the slurry outlet of the slurry laying mechanism 30 are in a horizontal state, and the position of the horizontal laser rays O2 emitted by the laser generator 200 and received by the leveling detection member 53 on the slurry laying mechanism 30 is at the horizontal zero point.

As shown in FIGS. 7 and 9, when the ground is uneven, the chassis 10 is inclined. At this time, the slurry laying mechanism 30 follows the chassis 10 to tilt. The chassis 10 in FIG. 7 is inclined to the left, and the chassis 10 in FIG. 9 is inclined to the right. The leveling detection member 53 on the slurry laying mechanism 30 senses that the position of the horizontal laser rays O2 emitted by the laser generator 200 is away from the horizontal zero position, the leveling detection member 53 generates a signal, and the third motor 511 is controlled by a program to drive a piston rod of the linear electric cylinder 512 to move up and down, thereby driving the connecting rod 56, the linear guide rail 54, the rotating member 52, the leveling detection member 53, the pin shaft 55, and the slurry box 31 to move up and down together until the horizontal laser rays O2 emitted by the laser generator 200 returns to the horizontal zero position of the leveling detection member 53. At this time, the slurry outlet is in the horizontal state as shown in FIGS. 8 and 10.

As shown in FIG. 11, when the chassis 10 is not offset, the slurry outlet of the slurry laying mechanism 30 and the chassis 10 are in an aligned state. At this time, the position of the vertical laser rays O1 emitted by the laser generator 200 and received by the deviation correction detection member 24 on the slurry laying mechanism 30 is at the vertical zero position. As shown in FIGS. 12 and 13, when the chassis 10 is offset, the slurry laying mechanism 30 is also offset with the chassis 10, the deviation correction detection member 24 on the slurry laying mechanism 30 senses that the position of the vertical laser rays O1 emitted by the laser generator 200 is away from the vertical zero position, the deviation correction detection member 24 generates a signal, the first drive motor 21 is controlled by a program to drive, through the coupling 27, the lead screw 22 to rotate, the lead screw 22 generates a thrust to the nut 25 fixed on the nut fixing base 29, the nut 25 generates a reaction thrust to the lead screw 22, and the lead screw 22 makes the movable base 23, the connecting plate 231 and the deviation correction

detection member 24 perform a translational motion together through the lead screw support base 26 until the position of the vertical laser rays O1 emitted by the laser generator 200 returns the vertical zero position of the deviation correction detection member 24. As shown in FIG. 12, the chassis 10 deviates to the right, and the movable base 23 of the translation deviation correction mechanism 20 drives the slurry laying mechanism 30 to move to the left for deviation correction so that the position of the received vertical laser rays O1 returns to the vertical zero position. As shown in FIG. 13, the chassis 10 deviates to the left, and the movable base 23 of the translation deviation correction mechanism 20 drives the slurry laying mechanism 30 to move to the right for deviation correction so that the position of the received vertical laser rays O1 returns to the vertical zero position. In this manner, a position of the slurry outlet remains unchanged relative to the position of the vertical laser rays O1 emitted by the laser generator 200, so that a toothed slurry surface on the same horizontal plane and in a straight line can be achieved for laying tiles.

To sum up, in the present application, the chassis 10, the slurry supply mechanism 40, the translation deviation correction mechanism 20, the up-down leveling mechanism 50, and the slurry laying mechanism 30 are combined into a whole, and the laser rays emitted by the laser generator 200 is used as a reference line, so that the toothed slurry surface laid on the same horizontal plane and in a straight line can be achieved. In addition, the fluid in the present application is not limited to mortar, and may also be tile glue or the like.

A floor tile laying robot (not shown) in an embodiment of the present application includes the preceding fluid laying device 100.

In the floor tile laying robot in the embodiment of the present application, the fluid laying device 100 is used, the vertical laser rays O1 is used as the reference parallel to the floor tile edge line, and the deviation correction detection member 24 receives the signal of the laser rays parallel to the floor tile edge line to control the translation deviation correction mechanism 20 to perform deviation correction on the slurry laying mechanism 3 in the horizontal direction 0. In this manner, it can be ensured that a laid slurry surface is linearly laid, and manual work can be replaced to complete laying of an adhesive fluid, thereby avoiding a quality problem caused by nonstandard manual operation, reducing the labor intensity of workers, and improving the slurry laying efficiency.

A slurry laying method in an embodiment of the present application includes the preceding fluid laying device 100.

As shown in FIGS. 6 to 13, the slurry laying method includes the steps described below.

In step S1, the chassis 10 moves along a slurry laying direction, the slurry supply mechanism 40 delivers the fluid to the slurry laying mechanism 30, and the slurry laying mechanism 30 lays the slurry on the construction surface 300. That is to say, when the fluid laying device 100 works normally, the construction surface 300 is horizontal, the chassis 10 and the slurry laying mechanism 30 are in a horizontal state, the chassis 10 is not offset, the slurry laying mechanism 30 and the chassis 10 are in an aligned state, the position of the vertical laser rays O1 emitted by the laser generator 200 and received by the deviation correction detection member 24 is at the vertical zero position, and the fluid laying device 100 performs slurry laying linearly.

10 In step S2, the deviation correction detection member 23 controls the translation deviation correction mechanism 20 according to the received laser rays to adjust a horizontal position of the slurry laying mechanism 30 so as to perform slurry laying linearly along the laying direction.

Specifically, when the position of the vertical laser rays O1 received by the deviation correction detection member 24 is not at the vertical zero position, the movable base 23 drives the slurry laying mechanism 30 to move until the position of the vertical laser rays O1 received by the deviation correction detection member 24 returns to the vertical zero position.

That is to say, when the chassis 10 is offset, the slurry laying mechanism 30 and the chassis 10 are not in the aligned state. At this time, the position of the vertical laser rays O1 received by the deviation correction detection member 24 is not at the vertical zero position, the translation deviation correction mechanism 20 is started, and the movable base 23 drives the slurry laying mechanism 30 to move for deviation correction until the position of the vertical laser rays O1 received by the deviation correction detection member 24 returns to the vertical zero position.

Optionally, the deviation correction detection member 24 may directly control the translation deviation correction mechanism 20 according to the received laser rays. Alternatively, a controller (not shown) is provided in the fluid laying device 100, the deviation correction detection member 24 converts the received laser rays into an electrical signal and transmits the electrical signal to the controller, and the controller controls the translation deviation correction mechanism 20 according to the electrical signal.

30 According to the slurry laying method of the embodiment of the present application, taking the

vertical laser rays O1 as the reference parallel to the floor tile edge line, the deviation correction detection member 24 receives the signal of the laser rays parallel to the floor tile edge line to control the translation deviation correction mechanism 20 to perform deviation correction on the slurry laying mechanism 30 in the horizontal direction. Due to ground flatness, sundries (such as gravel) and other reasons, the existing slurry laying robot cannot move in a straight line, and slurry laying cannot be performed linearly. In the present application, it can be ensured that a laid slurry surface is linearly laid, and manual work can be replaced to complete laying of an adhesive fluid, thereby avoiding a quality problem caused by nonstandard manual operation, reducing the labor intensity of workers and improving the slurry laying efficiency.

In some embodiments, the fluid laying device 100 further includes the up-down leveling mechanism 50 that is disposed between the movable base 23 and the slurry laying mechanism 30 and includes the leveling detection member 53.

The slurry laying method further includes the step described below.

In step S3, the leveling detection member 53 controls the up-down leveling mechanism 50 according to the laser rays to adjust a height of the slurry laying mechanism 30 to keep the bottom of the slurry laying mechanism 30 parallel to the construction surface. Specifically, the bottom of the slurry laying mechanism 30 refers to the bottom edge of the toothed scraper 32.

Specifically, when the fluid laying device 100 works normally, the position of the horizontal laser rays O2 emitted by the laser generator 200 and received by the leveling detection member 53 is at the horizontal zero position. When the fluid laying device 100 works and the position of the horizontal laser rays O2 received by the leveling detection member 53 is not at the horizontal zero position, the up-down leveling mechanism 50 drives at least one end of the slurry laying mechanism 30 to ascend and descend until the position of the horizontal laser rays O2 received by the leveling detection member 53 returns to the horizontal zero position.

That is to say, when the construction surface 300 is not horizontal, the chassis 10 and the slurry laying mechanism 30 are not in a horizontal state. At this time, the position of the horizontal laser rays O2 received by the leveling detection member 53 is not at the horizontal zero position, and the up-down leveling mechanism 50 is started to drive the left end or right end of the slurry laying mechanism 30 to ascend and descend until the position of the horizontal laser rays O2 received by the leveling detection member 53 returns to the horizontal zero position.

Optionally, the deviation correction detection member 24 may directly control the up-down leveling mechanism 50 according to the received laser rays. Alternatively, a controller (not shown) is provided in the fluid laying device 100, the deviation correction detection member 24 converts the received laser rays into an electrical signal and transmits the electrical signal to the controller, and the controller controls the up-down leveling mechanism 50 according to the electrical signal.

Other configurations and operations of the fluid laying device 100 according to the embodiments of the present application are known to those of ordinary skill in the art and not described in detail here.

In the description of the specification, the description of reference terms "embodiment" or "example" means that specific features, structures, materials or characteristics described in conjunction with this embodiment or example are included in at least one embodiment or example of the present application. In the specification, the illustrative description of the preceding terms does not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures, materials or characteristics may be combined in an appropriate manner in any one or more embodiments or examples.

Although the embodiments of the present application have been shown and described, it is to be understood by those of ordinary skill in the art that multiple variations, modifications, substitutions and alterations can be made in these embodiments without departing from the principle and spirit of the present application. The scope of the present application is defined by the claims and equivalents thereof.

What is claimed is:

1. A fluid laying device, comprising:

a chassis;

5 a translation deviation correction mechanism disposed on the chassis and comprising a movable base configured to move in a direction perpendicular to a laying direction of fluid and a deviation correction detection member disposed on the movable base;

a slurry laying mechanism connected to the movable base; and

a slurry supply mechanism disposed on the chassis to supply the fluid to the slurry laying mechanism,

10 wherein when the fluid laying device works, the deviation correction detection member controls the movable base according to received laser rays so that the slurry laying mechanism performs slurry laying linearly along the laying direction.

2. The fluid laying device of claim 1, wherein the translation deviation correction mechanism further comprises:

15 a drive member disposed on the movable base; and

a movement assembly comprising a moving part and a guide support connected to the moving part, wherein the moving part is connected to the drive member, and the guide support is connected to the chassis.

3. The fluid laying device of claim 2, wherein:

20 the drive member is a first drive motor;

the moving part is a lead screw, wherein the lead screw is connected to an output end of the first drive motor; and

the guide support is a nut, wherein the nut is fitted on the lead screw and is connected to the chassis.

25 4. The fluid laying device of claim 1, further comprising:

an up-down leveling mechanism disposed between the movable base and the slurry laying

mechanism and comprising a lifter and a leveling detection member, wherein the lifter is disposed on the movable base, an output end of the lifter is connected to the slurry laying mechanism, and the leveling detection member is disposed on the movable base,

5 wherein when the fluid laying device works, the leveling detection member controls the lifter to ascend and descend according to received laser rays so that a bottom of the slurry laying mechanism is kept parallel to a construction surface.

10 5. The fluid laying device of claim 4, wherein the lifter comprises a third motor and a linear electric cylinder, wherein the third motor is drivingly connected to the linear electric cylinder to drive the linear electric cylinder to stretch out and draw back, and a telescopic rod of the linear electric cylinder is drivingly connected to the slurry laying mechanism.

15 6. The fluid laying device of claim 4, wherein the up-down leveling mechanism further comprises a rotating member, wherein the rotating member is disposed on the movable base and rotatable around a vertical axis, an output end of the rotating member is drivingly connected to the leveling detection member, and the rotating member is capable of adjusting a detection direction of the leveling detection member.

7. The fluid laying device of claim 4, wherein two up-down leveling mechanism are provided, wherein the two up-down leveling mechanisms are correspondingly disposed at two ends of the slurry laying mechanism in a length direction of the slurry laying mechanism to adjust heights of the two ends of the slurry laying mechanism respectively.

20 8. The fluid laying device of claim 4, wherein the up-down leveling mechanism further comprises a linear guide rail, wherein the linear guide rail is drivingly connected to the output end of the lifter, a slider of the linear guide rail is connected to the movable base, and the linear guide rail is connected to the slurry laying mechanism.

9. The fluid laying device of claim 1, wherein the slurry laying mechanism comprises:

25 a slurry box, wherein a slurry outlet is provided below the slurry box; and

a toothed scraper disposed on the slurry outlet and extending in a length direction of the slurry box.

10. The fluid laying device of claim 9, wherein the slurry supply mechanism comprises:

a slurry hopper disposed on the chassis;

30 a screw delivery rod pivotally disposed in the slurry hopper;

a delivery pipe disposed on the slurry hopper, wherein one end of the delivery pipe is communicated with a delivery end of the screw delivery rod and another end of the delivery pipe is communicated with the slurry box; and

5 a second drive motor, wherein an output end of the second drive motor is drivingly connected to the screw delivery rod.

10 11. The fluid laying device of claim 10, wherein a chain transmission mechanism is disposed between the second drive motor and the screw delivery rod and comprises a transmission chain and two sprockets, wherein the two sprockets are drivingly connected to the output end of the second drive motor and the screw delivery rod respectively, and the transmission chain is sleeved on the two sprockets.

12. The fluid laying device of claim 1, wherein the chassis comprises:

a chassis body;

a moving wheel disposed below the chassis body; and

a control cabinet disposed below the chassis body.

15 13. The fluid laying device of claim 12, wherein the chassis further comprises a power supply system, wherein the power supply system is disposed above the chassis body and configured to supply power to the moving wheel to drive the chassis body to move.

20 14. The fluid laying device of claim 1, further comprising a guiding mechanism, wherein the guiding mechanism is disposed between the movable base and the chassis and comprises a slide rail and a moving slider, wherein the slide rail is disposed on the chassis, and the moving slider is fitted on the slide rail and connected to the movable base.

15. A floor tile laying robot, comprising the fluid laying device of any one of claims 1 to 14.

16. A slurry laying method, comprising the fluid laying device of any one of claims 1 to 14;

wherein the slurry laying method comprises:

25 moving, by the chassis, along a slurry laying direction, delivering, by the slurry supply mechanism, the fluid to the slurry laying mechanism, and laying, by the slurry laying mechanism, the slurry on the construction surface; and

controlling, by the deviation correction detection member, the translation deviation correction

mechanism according to the received laser rays to adjust a horizontal position of the slurry laying mechanism so that slurry laying is performed linearly along the laying direction.

17. The slurry laying method of claim 16, further comprising:

- 5 controlling, by the leveling detection member, the up-down leveling mechanism according to the laser rays to adjust a height of the slurry laying mechanism so that the bottom of the slurry laying mechanism is kept parallel to the construction surface.