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ELECTROMECHANICAL INTEGRATED INTELLIGENT FLAW DETECTION DEVICE AND USING METHOD THEREOF.

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The invention discloses an electromechanical integrated intelligent flaw detection device and a using method thereof, and relates to the technical field of flaw detection equipment. The structure of the invention comprises a flaw detection vehicle and a power supply vehicle; the structure of the flaw detection vehicle comprises a No.1 housing, a driving mechanism, a positioning mechanism, a circuit box and a flaw detection mechanism; connecting columns are respectively arranged in the notches at the front and rear ends of the right lower edge of the No.1 housing, and a button is respectively arranged in the through holes of the front and rear side walls; the inner end of the button and the inner end of the connecting column are fixedly connected through a linkage plate, and the inner side of the linkage plate is provided with a No.1 spring.

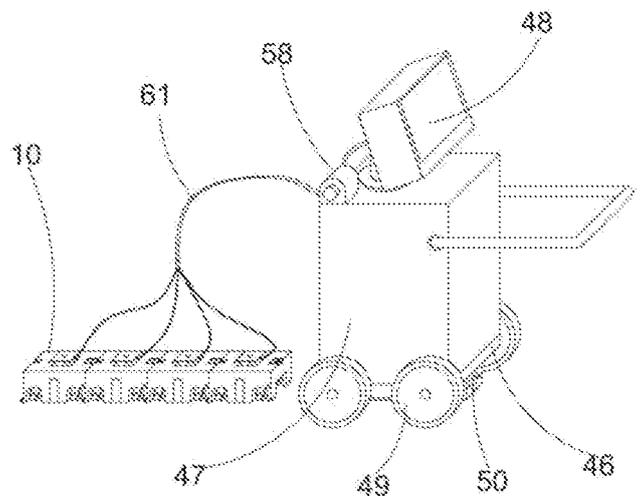


Fig.1

DESCRIPTION

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**ELECTROMECHANICAL INTEGRATED INTELLIGENT FLAW DETECTION
DEVICE AND USING METHOD THEREOF****TECHNICAL FIELD**

The invention relates to the technical field of flaw detection equipment, in particular to an electromechanical integrated intelligent flaw detection device and a using method thereof.

BACKGROUND

The flaw detector can be divided into digital ultrasonic flaw detector, ultrasonic flaw detector, magnetic particle flaw detector, eddy current flaw detector, ray flaw detector and fluorescence flaw detector according to different measuring principles. It is mainly used to detect whether there are defects in machined parts, such as cracks, sand holes, pores, white spots, inclusions, etc., whether the weld is qualified or not, and to find out whether there are hidden injuries, so as to judge whether the workpiece is qualified or not. Among them, ultrasonic flaw detector is a common flaw detector.

The ultrasonic flaw detector in the prior art invented the trolley structure, which can automatically move on the rail, thus realizing the purpose of continuously detecting the rail. However, the trolley structure has limitations on the flaw detection structure and single function. When the ultrasonic detector in the prior art detects the pipeline, it is necessary to manually move the ultrasonic probe to continuously detect the pipeline; In addition, it is not suitable for testing various types of pipelines.

Therefore, technicians in this field have provided an intelligent flaw detection device with mechatronics and its using method to solve the problems raised in the above background.

SUMMARY

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The technical problem to be solved by the invention is to overcome the single function of the ultrasonic flaw detector in the prior art, which is inconvenient for continuous flaw detection of different types of pipelines.

In order to solve the above technical problems, the invention provides an electromechanical integrated intelligent flaw detection device, which comprises a flaw detection vehicle and a power supply vehicle; the structure of the flaw detection vehicle comprises a No.1 housing, a driving mechanism, a positioning mechanism, a circuit box and a flaw detection mechanism; the No.1 housing has a U-shaped cylindrical housing structure; a cylindrical connecting column is respectively arranged in the gap at the front and rear ends of the right lower edge of the No.1 housing, and a button is respectively arranged in the through holes of the front and rear side walls; the inner end of the button and the inner end of the connecting column are fixedly connected through a linkage plate, and the inner side of the linkage plate is provided with a No.1 spring; a tubular connector is respectively fixed at the front and rear ends of the left lower side wall of the No.1 housing; a first ultrasonic probe is arranged in the through hole of the top side wall of the bottom groove of the No.1 housing; the structure of the power supply vehicle comprises a bottom plate, a battery box and a computer; the bottom plate has a rectangular plate structure, and two No.2 wheels are respectively arranged at the front and rear sides; the battery box is fixed on the top side wall of the bottom plate; the computer is arranged on the top side wall of the battery box.

The structure of the driving mechanism comprises a No.1 wheel, a rotating column, a moving plate, a No.1 motor, a No.1 gear and a No.2 motor; the No.1 wheel is provided with an inverted U-shaped wheel carrier; the wheel carrier is provided with a driving motor; the rotor of the driving motor is fixed with the axle of the No.1 wheel; there are four No.1 wheels, which are respectively arranged in four notches at the bottom of the No.1 housing; the rotating column has a cylindrical structure, and strip-shaped tooth patterns are arranged on the outer side wall; there are four rotating columns, which are respectively arranged in cavities at four corners of the No.1

housing; the bottom end of each rotating column is respectively fixed with the top end of a wheel carrier of a No.1 wheel, and the top end is rotatably connected with a moving plate through a bearing; the moving plate is in a circular plate structure; the moving plate is arranged in the top cavity of the No.1 housing; a guiding rod is arranged in the vertical through hole of the moving plate; the guiding rod is vertically fixed in the top cavity of the No.1 housing; the No.1 motor is arranged in the top cavity of the No.1 housing and a No.1 screw rod is fixed at the top end of the rotor; the moving block of the screw sleeve on the No.1 screw rod is fixed in the through hole of the moving plate; there are four No.1 gears, which are all arranged in the top cavity of the No.1 housing; a driven wheel is respectively arranged at the top end of the gear column of each No.1 gear, and each No.1 gear is respectively meshed with a rotating column; the No.2 motor is arranged in the top cavity of the No.1 housing; a driving wheel is fixed at the top end of the rotor of the No.2 motor; the driving wheel and four driven wheels are connected by a belt. LU506342

The structure of the positioning mechanism comprises two guiding blocks and double-headed cylinders, and the two guiding blocks are arranged on the top side wall of the bottom groove of the No.1 housing; the double-headed cylinder is arranged on the bottom side wall of the top cavity of the No.1 housing; two ends of the double-headed cylinder are respectively fixedly connected with two guiding blocks.

The circuit box is fixed on the top side wall of the No.1 housing; a control circuit board is arranged in the circuit box, and a No.1 interface, a controlling button and an audible and visual alarm are arranged in the side wall through holes; the control circuit board is electrically connected with the driving mechanism, the positioning mechanism and the flaw detection mechanism; the controlling button is electrically connected with the control circuit board; the audible and visual alarm is electrically connected with the control circuit board; the No.1 interface is electrically connected with the control circuit board; the plug of the data line is inserted into the No.1 interface.

The structure of the flaw detection mechanism comprises a moving column and a No.3 motor; the moving column is in a quadrangular prism housing structure; a No.2 ultrasonic probe is arranged in the bottom through hole of the moving column; two moving columns are respectively arranged in the grooves of the front and rear side walls of the No.1 housing; there are two No.3 motors, which are respectively arranged in the through holes of the front and rear walls of the No.1 housing; a No.2 screw rod is fixed at the top end of the rotor of each No.3 motor; the moving block of the screw sleeve on each No.2 screw rod is fixedly connected with a moving column respectively.

The lower side of the bottom plate is provided with a limit rail, and the structure of the limit rail comprises an upper rail and a side rail; the upper rail is in an inverted U-shaped column structure, and a positioning groove is fixed on the bottom side wall; the upper rail is fixed on the bottom side wall of the bottom plate; the side rail is in a column structure, and a positioning column is respectively arranged in the through hole of the top side wall; the bottom end of the positioning column is connected with the side rail through a second spring; a reel is arranged in the groove of the side wall of the side rail, and a pull rope is fixed on the reel; the top end of the pull rope is fixed with the bottom end of the positioning column, and the second knob is fixed at the outer end of the reel; the two side rails are respectively hinged with the two bottom ends of the upper rail through hinges.

A winding machine is arranged on the battery box; the structure of the winding machine comprises a second housing, a drum, a fourth motor and a rotating head; the second housing is a semi-elliptical cylindrical housing structure, and the strip-shaped through hole arranged on the left side wall is a threading hole; the second housing is fixed on the top side wall of the battery box; the drum has a cylindrical housing structure, is arranged in the cavity of the No.2 housing, and the rear end of the drum is rotatably connected with the rear wall of the No.2 housing through a torsion spring; a data wire is wound on the drum; the No.4 motor is fixed on the front side wall of the No.2 housing; the rotor end of the No.4 motor is fixedly connected with the front end of the drum; the rotating head is arranged in the through hole of the rear side wall of the No.2 housing and fixed in the through hole of the rear wall of the drum; a second

interface is arranged in the through hole of the rotating head; the data line is inserted into the cavity of the drum and electrically connected with the No.2 interface. LU506342

A connecting block is arranged in the right end gap of the top side wall of the No.1 housing, and a slider is respectively arranged at the front and rear ends of the connecting block, and the two sliders are respectively inserted into the chutes of the front and rear side walls of the right end gap, and an insertion block is respectively arranged in the grooves of the front and rear side walls of the connecting block, and teeth are arranged on the insertion block; a No.2 gear is arranged in the cavity of the connecting block, and the left and right ends of the No.2 gear are respectively meshed with the two insertion blocks, and the top side wall of the connecting block is provided with a gear. The left end gap of the top side wall of the No.1 housing is a connection port, and the front and rear side walls of the connection port are respectively provided with slots.

The invention also provides an intelligent flaw detection device adopting the electromechanical integration, and the using steps are as follows:

1) firstly, several flaw detection vehicles are arranged horizontally, and the slider of the left flaw detection vehicle slides to the right in the chute, so that the connecting block is inserted into the connecting port of the right flaw detection vehicle to the right; rotating the No.1 knob drives the No.2 gear to rotate, and the No.2 gear drives two insertion blocks to be inserted into the slot after being extracted from the connecting block, so that the connecting block is fixed in the connecting port;

2) cover the flaw detection vehicle on the rail so that the No.1 ultrasonic probe (16) sticks to the top side wall of the rail, and then control the double-headed cylinder, the No.1 motor and the No.3 motor to run; the double-headed cylinder drives two guiding blocks to move towards each other, and the two guiding blocks are attached to both sides of the rail respectively; the No.1 motor drives the No.1 screw rod to rotate, so that the moving block drives the moving plate to move downwards, and the No.1 wheel is driven to move downwards through the rotating column, so that the No.1 wheel abuts on the rail seat; the No.3 motor drives the No.2 screw to rotate, so that the moving block drives the moving column to move up or down, so that the No.2 ultrasonic probe sticks to the seat of the rail; the driving motor drives the No.1 wheel

to rotate, so that the No.1 wheel rolls on the rail, so that the No.1 ultrasonic probe continuously detects the rail and the No.2 ultrasonic probe continuously detects the rail seat; LU506342

3) take a number of flaw detection vehicles, first press the button of one flaw detection vehicle inward, and drive the connecting column to retract into the No.1 housing through the linkage plate; then insert the connector of one flaw detection vehicle into the gap of the adjacent flaw detection vehicle; after that, the button is loosened, and the No.1 spring pushes the connecting column to move outwards through the linkage plate, so that the connecting column is inserted into the connector, and the two flaw detection vehicles are hinged; a plurality of flaw detection vehicles are connected in series in a ring shape and sleeved on a pipeline;

4) controlling a plurality of flaw detection vehicles to run synchronously, so that a plurality of No.1 wheels abut against the outer side wall of the pipeline, and controlling the No.3 motors of the flaw detection vehicles to run, so that a plurality of No.2 ultrasonic probes are stuck on the outer side wall of the pipeline; then, the driving motor drives the No.1 wheel to rotate along the pipeline for one turn, so that the No.2 ultrasonic probe can carry out flaw detection around the pipeline; then the No.2 motor runs to drive the driving wheel to rotate, and the driving wheel drives the driven wheel to rotate through the belt; the driven wheel drives the No.1 gear to rotate, so that the No.1 gear drives the rotating column to rotate; after the rotating column rotates horizontally, it drives the No.1 wheel to rotate by 90°, so that the No.1 wheel rolls in the direction of the pipeline and carries out flaw detection on the next pipeline.

In Step 2), when the flaw detection vehicle moves on the rail, push the power supply vehicle along the rail: firstly, put the upper rail on the rail; then turn the No.2 knob, and the No.2 knob drives the reel to rotate, and the reel winds up the pull rope, and the pull rope pulls the positioning column downwards, so that the positioning column retracts into the side rail; at the same time, rotate the side rail downward so that the side rail sticks to the side of the rail, and then loosen the No.2 knob; the second spring pushes the positioning column upwards, so that the positioning column is inserted into the positioning groove, and the side rail and the upper rail are positioned; the side rails are attached to both sides of the rail, so that the limit rail

slides along the rail, which is convenient for the power supply vehicle to move on the rail. LU506342

In step 1) or step 3), after the flaw detection vehicle is installed on the rail or pipeline, the flaw detection vehicle is electrically connected with the power supply vehicle: the plugs of the battery box and the computer are inserted into the No.2 interface, and the plugs of the data cables are inserted into the No.1 interface, so that the power supply vehicle is electrically connected with the flaw detection vehicle; No.4 motor drives the drum to rotate, so that the drum winds up or winds up the data line; when the data cable is tripped, the data cable pulls the drum, the drum rotates to release the data cable, and the torsion spring twists to play a buffering role.

The invention has the beneficial effects that:

(1) The flaw detection vehicle is arranged in the invention, and the ultrasonic flaw detector in the prior art cannot be applied to both the rail and the pipeline; according to the flaw detection vehicle, a plurality of flaw detection vehicles can be connected in series in a string through the connecting column and the connector, and the rail can be continuously inspected for multiple times; a plurality of flaw detection vehicles are connected in series in a ring shape and sleeved on the pipeline, and the plurality of flaw detection vehicles rotate around the pipeline to continuously detect the impassable direction of the pipeline.

(2) The invention is provided with a driving mechanism, and the ultrasonic flaw detector in the prior art often moves the probe manually to detect the impassable part of the pipeline; according to the telescopic No.1 wheel and the moving column, a plurality of flaw detectors are positioned on the pipeline, the No.1 wheel can roll around the pipeline, and the No.2 ultrasonic probe can be wound around different directions of the pipeline for flaw detection; according to the rotatable rotating column, the No.1 wheel can rotate to be horizontal to the pipeline, the No.1 wheel can roll along the pipeline, and the No.2 ultrasonic probe can move to the impassable part of the pipeline for flaw detection.

(3) The invention is provided with the limit rail, so that the power supply vehicle in the prior art is inconvenient to roll on the uneven rail path; In the invention, the side rail and the upper rail are connected in a hinged way, so that it is convenient to install or remove the limit rail on the rail, and the limit rail slides along the rail, so that the power supply vehicle moves along the rail. LU506342

(4) The winding machine is arranged in the invention, so that the data line between the ultrasonic flaw detection vehicle and the power supply vehicle in the prior art is easily hooked and becomes an obstacle; the winding machine of the invention can automatically take in and take out the data line, which is convenient for adjusting the line length during the moving process; and the tension of the data line on the drum is buffered by the torsion of the torsion spring.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is a perspective view of the present invention;

Fig. 2 is a perspective view of the flaw detection vehicle;

Fig. 3 is a sectional view of the right side of the flaw detection vehicle;

Fig. 4 is a horizontal sectional view of the flaw detection vehicle;

Fig. 5 is a horizontal sectional view of the connecting block;

Fig. 6 is a schematic diagram of pipeline inspection by flaw detection vehicle;

Fig. 7 is a sectional view of the limit rail;

Fig. 8 is a left sectional view of the winding machine;

wherein: No.1 housing 10, wheel carrier 11, No.1 wheel 12, driving motor 13, guiding block 14, double-headed cylinder 15, No.1 ultrasonic probe 16, rotating column 17, moving plate 18, No.1 motor 19, No.1 screw rod 20, guiding rod 21, No.1 gear 22, driven wheel 23, belt 24, No.2 motor 25, driving wheel 26, moving column 27, No.3 motor 28, No.2 lead screw 29, connecting column 30, linkage plate 31, No.1 spring 32, button 33, connector 34, connecting block 35, slider 36, insertion block 37, No.2 gear 38, No.1 knob 39, connecting port 40, slot 41, circuit box 42, No.1 interface 43, controlling button 44, audible and visual alarm 45, bottom plate 46, battery box 47, computer 48, No.2 wheel 49, upper rail 50, side rail 51, positioning column 52, No.2

spring 53, reel 54, pull rope 55, No.2 knob 56, No.2 housing 58, drum 59, data line 61, LU506342 rotating head 62, No.2 interface 63, No.4 motor 64 and pipeline 65.

DESCRIPTION OF THE INVENTION

An electromechanical integrated intelligent flaw detection device provided by this embodiment has the structure as shown in Figs. 2-5 and Figs. 7-8, including a flaw detection vehicle and a power supply vehicle. The structure of the flaw detection vehicle includes a No.1 housing 10, a driving mechanism, a positioning mechanism, a circuit box 42 and a flaw detection mechanism. The No.1 housing 10 has a U-shaped cylindrical housing structure. A cylindrical connecting column 30 is respectively arranged in the notches at the front and rear ends of the right lower edge of the No.1 housing 10, and a button 33 is respectively arranged in the through holes of the front and rear side walls. The inner end of the button 33 is fixedly connected with the inner end of the connecting column 30 through a linkage plate 31, and a No.1 spring 32 is arranged on the inner side of the linkage plate 31, so that the button 33 is pressed inward and the connecting column is driven to retract into the No.1 housing 10 through the linkage plate 31. A tubular connector 34 is respectively fixed at the front and rear ends of the left lower side wall of the No.1 housing 10. The connector 34 of one flaw detection vehicle is first inserted into the notch of another flaw detection vehicle, and then the button 33 is loosened. The No.1 spring 32 pushes the connecting column 30 to move outward through the linkage plate 31, so that the connecting column 30 is inserted into the connector 34, and the two flaw detection vehicles are hinged. A No.1 ultrasonic wave is arranged in the through hole of the top side wall of the bottom groove of the No.1 housing 10. The structure of the power supply vehicle includes a bottom plate 46, a battery box 47 and a computer 48, wherein the bottom plate 46 has a rectangular plate structure, and two No.2 wheels 49 are respectively arranged at the front and rear sides; the battery box 47 is fixed on the top side wall of the bottom plate 46 to provide electric energy; and the computer 48 is arranged on the top side wall of the battery box 47 to receive and process signals of ultrasonic probes and control the operation of the flaw detection vehicle.

The structure of the driving mechanism comprises a No.1 wheel 12, a rotating column 17, a moving plate 18, a No.1 motor 19, a No.1 gear 22 and a No.2 motor 25, wherein an inverted U-shaped wheel carrier 11 is arranged on the No.1 wheel 12, and a driving motor 13 is arranged on the wheel carrier 11; the rotor of the driving motor 13 is fixed with the axle of the No.1 wheel 12, and there are four No.1 wheels 12, which are respectively arranged on No.1 wheel. The rotating columns 17 have a cylindrical structure, and strip-shaped teeth are arranged on the outer side wall. There are four rotating columns 17, which are respectively arranged in the cavities at the four corners of the No.1 housing 10. The bottom end of each rotating column 17 is respectively fixed with the top end of a wheel carrier 11 of a No.1 wheel, and the top end of each rotating column 17 is rotatably connected with a moving plate 18 through a bearing. After horizontally rotating, the rotating columns 17 drive the No.1 wheel 12 to rotate, so as to adjust the number of wheels 12. The moving plate 18 has a circular plate structure, which is arranged in the top cavity of the No.1 housing 10. A guiding rod 21 is arranged in the vertical through hole of the moving plate 18, which is vertically fixed in the top cavity of the No.1 housing 10 and plays a guiding role. After the moving plate 18 moves downward, the No.1 wheel 12 is driven to move downward through the rotating column 17, so that the No.1 wheel 12 abuts against the rail seat or the outer side wall of the pipeline 65. The No.1 motor 19 is arranged in the top cavity of the No.1 housing 10, and a No.1 screw rod 20 is fixed at the top end of the rotor, and the moving block of the screw sleeve on the No.1 screw rod 20 is fixed in the through hole of the moving plate 18, and the No.1 motor 19 drives the No.1 screw rod 20 to rotate, so that the moving block drives the moving plate 18 to move up or down; there are four No.1 gears 22, all of which are arranged in the top cavity of No.1 housing 10. The top end of the gear column of each No.1 gear 22 is respectively provided with a driven wheel 23, and each No.1 gear 22 is engaged with a rotating column 17. The driven wheel 23 drives the No.1 gear 22 to rotate, so that the No.1 gear 22 drives the rotating column 17 to rotate. The No.2 motor 25 is arranged in the top cavity of the No.1 housing 10, and a driving wheel 26 is fixed at the top end of the rotor of the No.2 motor 25, which is connected with four driven wheels 23 through a belt 24.

The No.2 motor 25 drives the driving wheel 26 to rotate, and the driving wheel 26 LU506342 drives the driven wheels 23 to rotate through the belt 24.

The structure of the positioning mechanism includes two guiding blocks 14 and double-headed cylinders 15, wherein the two guiding blocks 14 are arranged on the top side wall of the bottom groove of the No.1 housing 10, and the two guiding blocks 14 are attached to both sides of the rail respectively and slide along the rail to define the trajectory of the flaw detection vehicle; the double-headed cylinder 15 is arranged on the bottom side wall of the top cavity of the No.1 housing 10, and both ends of the double-headed cylinder 15 are fixedly connected with the two guiding blocks 14 respectively. After the double-headed cylinder 15 contracts, the two guiding blocks 14 are driven to move towards each other.

The circuit box 42 is fixed on the top side wall of the No.1 housing 10, and a control circuit board is arranged in the circuit box 42, and the side wall through hole is provided with a No.1 interface 43, a controlling button 44 and an audible and visual alarm 45. The control circuit board is electrically connected with the driving mechanism, the positioning mechanism and the flaw detection mechanism, and plays the role of central control processing; the controlling button 44 is electrically connected with the control circuit board to facilitate the transmission of instructions; the audible and visual alarm 45 is electrically connected with the control circuit board, and responds after the damage is detected, thus playing the role of reminding the user in time; the No.1 interface 43 is electrically connected with the control circuit board; the plug of the data line 61 is inserted into the No.1 interface 43, so that the signal between the flaw detection vehicle and the power supply vehicle can be exchanged.

The structure of the flaw detection mechanism comprises a moving column 27 and a No.3 motor 28; the moving column 27 has a quadrangular prism housing structure; a second ultrasonic probe is arranged in the bottom through hole of the moving column 27, and there are two moving columns 27, which are respectively arranged in the grooves of the front and rear side walls of the No.1 housing 10; after the moving column 27 moves downward, the No.2 ultrasonic probe is attached to the rail seat or the pipeline 65; there are two No.3 motors 28, which are respectively

arranged in the through holes of the front and rear walls of the No.1 housing 10; a No.2 screw rod 29 is fixed at the top end of the rotor of each No.3 motor 28; the moving block of the screw sleeve on each No.2 screw rod 29 is fixedly connected with a moving column 27; the No.3 motor 28 drives the No.2 screw 29 to rotate, so that the moving block drives the moving column 27 to move up or down.

The lower side of the bottom plate 46 is provided with a limit rail, and the structure of the limit rail includes an upper rail 50 and a side rail 51; the upper rail 50 has an inverted U-shaped column structure, and a positioning groove is fixed on the bottom side wall; the upper rail 50 is fixed on the bottom side wall of the bottom plate 46, and the upper rail 50 rides on the rail; the side rail 51 has a cylindrical structure, and a positioning column 52 is respectively arranged in the through hole of the top side wall; the bottom end of the positioning column 52 is connected with the side rail 51 through a second spring 53; the second spring 53 pushes the positioning column 52 upward, so that the positioning column 52 is inserted into the positioning groove, so that the side rail 51 and the upper rail 50 are positioned; a reel 54 is arranged in the groove of the side wall of the side rail 51, and a pull rope 55 is fixed on the reel 54; the reel 54 winds up a pull rope 55, and the top end of the pull rope 55 is fixed with the bottom end of the positioning column 52; the pull rope 55 pulls the positioning column 52 downward, so that the positioning column 52 retracts into the side rail 51; a second knob 56 is fixed at the outer end of the reel 54; the No.2 knob 56 drives the reel 54 to rotate; there are two side rails 51, which are respectively hinged with the two bottom ends of the upper rail 50 through hinges; the side rails 51 are attached to both sides of the rail, so that the limit rail slides along the rail, which is convenient for the power supply vehicle to move on the rail.

The battery box 47 is provided with a winding machine, and the structure of the winding machine comprises a second housing 58, a drum 59, a fourth motor 64 and a rotating head 62; the second housing 58 has a semi-elliptical cylindrical housing structure, and the strip-shaped through hole arranged on the left side wall is a threading hole; the second housing 58 is fixed on the top side wall of the battery box 47; the drum 59 has a cylindrical housing structure; the drum 59 is arranged in the cavity of the No.2 housing 58, and the rear end of the drum 59 is rotatably connected

with the rear wall of the No.2 housing 58 through a torsion spring 60; the data wire 61 is wound around the drum 59, and when the data wire 61 is tripped, the data wire pulls the drum 59, the drum 59 rotates to release the data wire 61, and the torsion spring 60 twists to play a buffering role; the No.4 motor 64 is fixed on the front side wall of the No.2 housing 58; the rotor end of the No.4 motor 64 is fixedly connected with the front end of the drum 59, and the No.4 motor 64 drives the drum 59 to rotate, so that the drum 59 winds or unwinds the data line 61; the rotating head 62 is arranged in the through hole of the rear side wall of the No.2 housing 58 and fixed in the through hole of the rear wall of the drum 59, and a No.2 interface 63 is arranged in the through hole of the rotating head 62, and the data line 61 is inserted into the cavity of the drum 59 and electrically connected with the No.2 interface 63; the plugs of the battery box 47 and the computer 48 are inserted into the No.2 interface 63, so that the power supply vehicle is electrically connected with the flaw detection vehicle. LU506342

A connecting block 35 is arranged in the gap at the right end of the top side wall of the No.1 housing 10, and a slider 36 is arranged at the front and rear ends of the connecting block 35. Two sliders 36 are respectively inserted into the chutes of the front and rear side walls of the right end gap; an insertion block 37 is respectively arranged in the grooves of the front and rear side walls of the connecting block 35; the insertion block 37 is provided with tooth patterns, and the cavity of the connecting block 35 is provided with a No.2 gear 38; the left and right ends of the No.2 gear 38 are respectively engaged with two insertion blocks 37; the top side wall of the connecting block 35 is provided with a No.1 knob 39; the rotor of the No.1 knob 39 is fixedly connected with the gear column of the No.2 gear 38; the left end gap of the top side wall of the No.1 housing 10 is a connection port 40; the front and rear side walls of the connection port 40 are respectively provided with slots 41; the slider 36 of one flaw detection vehicle slides to the right in the chute, so that the connecting block 37 is inserted to the right in the connecting port 40 of another flaw detection vehicle; rotating the No.1 knob 39 drives the No.2 gear 38 to rotate; the No.2 gear 38 drives the two insertion blocks 37 to protrude from the connecting block 35 and then insert them into the slot 41, so that the connecting block 35 is fixed in the connecting port 40 and the two flaw detection vehicles are fixedly connected left and right.

With reference to Fig. 1 and Fig. 6, the use steps of the electromechanical integrated intelligent flaw detection device of the present invention are as follows: LU506342

1) firstly, several flaw detection vehicles are arranged horizontally, and the slider 36 of the left flaw detection vehicle slides to the right in the chute, so that the connecting block 35 is inserted into the connecting port 40 of the right flaw detection vehicle to the right; rotating the No.1 knob 39 drives the No.2 gear 38 to rotate, and the No.2 gear 38 drives two insertion blocks 37 to be inserted into the slot 41 after being extracted from the connecting block 35, so that the connecting block 35 is fixed in the connecting port 40;

2) cover the flaw detection vehicle on the rail so that the No.1 ultrasonic probe 16 sticks to the top side wall of the rail, and then control the double-headed cylinder 15, the No.1 motor 19 and the No.3 motor 28 to run; the double-headed cylinder 15 drives two guiding blocks 14 to move towards each other, and the two guiding blocks 14 are attached to both sides of the rail respectively; the No.1 motor 19 drives the No.1 screw rod 20 to rotate, so that the moving block drives the moving plate 18 to move downwards, and the No.1 wheel 12 is driven to move downwards through the rotating column 17, so that the No.1 wheel 12 abuts on the rail seat; the No.3 motor 28 drives the No.2 screw 29 to rotate, so that the moving block drives the moving column 27 to move up or down, so that the No.2 ultrasonic probe sticks to the seat of the rail; the driving motor 13 drives the No.1 wheel 12 to rotate, so that the No.1 wheel 12 rolls on the rail, so that the No.1 ultrasonic probe 16 continuously detects the rail and the No.2 ultrasonic probe continuously detects the rail seat;

3) take a number of flaw detection vehicles, first press the button 33 of one flaw detection vehicle inward, and drive the connecting column to retract into the No.1 housing 10 through the linkage plate 31; then insert the connector 34 of one flaw detection vehicle into the gap of the adjacent flaw detection vehicle; after that, the button 33 is loosened, and the No.1 spring 32 pushes the connecting column 30 to move outwards through the linkage plate 31, so that the connecting column 30 is inserted into the connector 34, and the two flaw detection vehicles are hinged; a plurality of flaw detection vehicles are connected in series in a ring shape and sleeved on a pipeline 65;

4) controlling a plurality of flaw detection vehicles to run synchronously, so that a plurality of No.1 wheels 12 abut against the outer side wall of the pipeline 65, and controlling the No.3 motors 28 of the flaw detection vehicles to run, so that a plurality of No.2 ultrasonic probes are stuck on the outer side wall of the pipeline 65; then, the driving motor 13 drives the No.1 wheel 12 to rotate along the pipeline 65 for one turn, so that the No.2 ultrasonic probe can carry out flaw detection around the pipeline 65; then the No.2 motor 25 runs to drive the driving wheel 26 to rotate, and the driving wheel 26 drives the driven wheel 23 to rotate through the belt 24; the driven wheel 23 drives the No.1 gear 22 to rotate, so that the No.1 gear 22 drives the rotating column 17 to rotate; after the rotating column 17 rotates horizontally, it drives the No.1 wheel 12 to rotate by 90°, so that the No.1 wheel 12 rolls in the direction of the pipeline 65 and carries out flaw detection on the next pipeline 65. LU506342

Step 2) When the flaw detection vehicle moves on the rail, push the power supply vehicle along the rail: firstly, put the upper rail on the rail; then turn the No.2 knob 56, and the No.2 knob 56 drives the reel 54 to rotate, and the reel 54 winds up the pull rope 55, and the pull rope 55 pulls the positioning column 52 downward, so that the positioning column 52 retracts into the side rail 51; at the same time, rotate the side rail 51 downward so that the side rail 51 sticks to the side of the rail, and then loosen the No.2 knob 56; the second spring 53 pushes the positioning column 52 upward, so that the positioning column 52 is inserted into the positioning groove, so that the side rail 51 and the upper rail 50 are positioned; side rails 51 are attached to both sides of the rail, so that the limit rail slides along the rail, which is convenient for the power supply vehicle to move on the rail.

In step 1) or step 3), after the flaw detection vehicle is installed on the rail or pipeline, the flaw detection vehicle is electrically connected with the power supply vehicle: the plugs of the battery box 47 and the computer 48 are inserted into the No.2 interface 63, and the plugs of the data line 61 are inserted into the No.1 interface 43, so that the power supply vehicle is electrically connected with the flaw detection vehicle; the No.4 motor 64 drives the drum 59 to rotate, so that the drum 59 winds up or unwinds the data line 61; when the data line 61 is tripped, the data line pulls the

drum 59, and the drum 59 rotates to release the data line 61, and the torsion spring 60 twists to play a buffering role. LU506342

The invention adopts a plurality of flaw detectors to move on the rail, and can simultaneously carry out ultrasonic flaw detection on the rail for many times; a plurality of flaw detectors are connected in series to form a ring, which is sleeved on the pipeline and rotates or goes straight on the pipeline, so that the pipeline can be continuously and automatically inspected.

It is obvious to those skilled in the art that the present invention is not limited to the details of the above-mentioned exemplary embodiments, but can be realized in other specific forms without departing from the spirit or essential characteristics of the present invention. Therefore, the embodiments should be considered in all aspects as illustrative and not restrictive, and the scope of the invention is defined by the appended claims rather than the above description, so it is intended to embrace all changes that come within the meaning and range of equivalents of the claims. Any reference signs in the claims shall not be construed as limiting the claims concerned.

In addition, it should be understood that although this specification is described in terms of embodiments, not every embodiment only contains an independent technical solution, and this description of the specification is only for the sake of clarity. Those skilled in the art should take the specification as a whole, and the technical solutions in various embodiments can also be appropriately combined to form other embodiments that can be understood by those skilled in the art.

CLAIMS

LU506342

1. An electromechanical integrated intelligent flaw detection device, characterized by comprising a flaw detection vehicle and a power supply vehicle; the structure of the flaw detection vehicle comprises a no.1 housing (10), a driving mechanism, a positioning mechanism, a circuit box (42) and a flaw detection mechanism; the no.1 housing (10) has a U-shaped cylindrical housing structure; a cylindrical connecting column (30) is respectively arranged in the gap at the front and rear ends of the right lower edge of the no.1 housing (10), and a button (33) is respectively arranged in the through holes of the front and rear side walls; the inner end of the button (33) and the inner end of the connecting column (30) are fixedly connected through a linkage plate (31), and the inner side of the linkage plate (31) is provided with a no.1 spring (32); a tubular connector (34) is respectively fixed at the front and rear ends of the left lower side wall of the no.1 housing (10); a first ultrasonic probe (16) is arranged in the through hole of the top side wall of the bottom groove of the no.1 housing (10); the structure of the power supply vehicle comprises a bottom plate (46), a battery box (47) and a computer (48); the bottom plate (46) has a rectangular plate structure, and two no.2 wheels (49) are respectively arranged at the front and rear sides; the battery box (47) is fixed on the top side wall of the bottom plate (46); the computer (48) is arranged on the top side wall of the battery box (47).

2. The electromechanical integrated intelligent flaw detection device according to claim 1, characterized in that the structure of the driving mechanism comprises a no.1 wheel (12), a rotating column (17), a moving plate (18), a no.1 motor (19), a no.1 gear (22) and a no.2 motor (25); the no.1 wheel (12) is provided with an inverted U-shaped wheel carrier (11); the wheel carrier (11) is provided with a driving motor (13); the rotor of the driving motor (13) is fixed with the axle of the no.1 wheel (12); there are four no.1 wheels (12), which are respectively arranged in four notches at the bottom of the no.1 housing (10); the rotating column (17) has a cylindrical structure, and strip-shaped tooth patterns are arranged on the outer side wall; there are four rotating columns (17), which are respectively arranged in cavities at four corners of the no.1

housing (10); the bottom end of each rotating column (17) is respectively fixed with the top end of a wheel carrier (11) of a no.1 wheel (12), and the top end is rotatably connected with a moving plate (18) through a bearing; the moving plate (18) is in a circular plate structure; the moving plate (18) is arranged in the top cavity of the no.1 housing (10); a guiding rod (21) is arranged in the vertical through hole of the moving plate (18); the guiding rod (21) is vertically fixed in the top cavity of the no.1 housing (10); the no.1 motor (19) is arranged in the top cavity of the no.1 housing (10), and a no.1 screw rod (20) is fixed at the top end of the rotor; the moving block of the screw sleeve on the no.1 screw rod (20) is fixed in the through hole of the moving plate (18); there are four no.1 gears (22), which are all arranged in the top cavity of the no.1 housing (10); a driven wheel (23) is respectively arranged at the top end of the gear column of each no.1 gear (22), and each no.1 gear (22) is respectively meshed with a rotating column (17); the no.2 motor (25) is arranged in the top cavity of the no.1 housing (10); a driving wheel (26) is fixed at the top end of the rotor of the no.2 motor (25); the driving wheel (26) and four driven wheels (23) are connected by a belt (24).

3. The electromechanical integrated intelligent flaw detection device according to claim 1, characterized in that the structure of the positioning mechanism comprises two guiding blocks (14) and double-headed cylinders (15), and the two guiding blocks (14) are arranged on the top side wall of the bottom groove of the no.1 housing (10); the double-headed cylinder (15) is arranged on the bottom side wall of the top cavity of the no.1 housing (10); two ends of the double-headed cylinder (15) are respectively fixedly connected with two guiding blocks (14).

4. The electromechanical integrated intelligent flaw detection device according to claim 1, characterized in that the circuit box (42) is fixed on the top side wall of the no.1 housing (10); a control circuit board is arranged in the circuit box (42), and a no.1 interface (43), a controlling button (44) and an audible and visual alarm (45) are arranged in the side wall through holes; the control circuit board is electrically connected with the driving mechanism, the positioning mechanism and the flaw detection mechanism; the controlling button (44) is electrically connected with the

control circuit board; the audible and visual alarm (45) is electrically connected with the control circuit board; the no.1 interface (43) is electrically connected with the control circuit board; the plug of the data line (61) is inserted into the no.1 interface (43). LU506342

5. The electromechanical integrated intelligent flaw detection device according to claim 1, characterized in that the structure of the flaw detection mechanism comprises a moving column (27) and a no.3 motor (28); the moving column (27) is in a quadrangular prism housing structure; a no.2 ultrasonic probe is arranged in the bottom through hole of the moving column (27); two moving columns (27) are respectively arranged in the grooves of the front and rear side walls of the no.1 housing (10); there are two no.3 motors (28), which are respectively arranged in the through holes of the front and rear walls of the no.1 housing (10); a no.2 screw rod (29) is fixed at the top end of the rotor of each no.3 motor (28); the moving block of the screw sleeve on each no.2 screw rod (29) is fixedly connected with a moving column (27) respectively.

6. The electromechanical integrated intelligent flaw detection device according to claim 1, characterized in that a connecting block (35) is arranged in the right end gap of the top side wall of the no.1 housing (10); the front and rear ends of the connecting block (35) are respectively provided with a slider (36); two sliders (36) are respectively inserted into the chutes of the front and rear side walls of the right end gap; an insertion block (37) is respectively arranged in the grooves of the front and rear side walls of the connecting block (35); the insertion block (37) is provided with tooth patterns, and the cavity of the connecting block (35) is provided with a no.2 gear (38); the left and right ends of the no.2 gear (38) are respectively meshed with two insertion blocks (37); a no.1 knob (39) is arranged on the top side wall of the connecting block (35); the rotor of the no.1 knob (39) is fixedly connected with the gear column of the no.2 gear (38); the left end gap of the top side wall of the no.1 housing (10) is a connection port (40), and the front and rear side walls of the connection port (40) are respectively provided with slots (41).

7. A method for using the mechatronics intelligent flaw detection device according to any one of claims 1-6, characterized by comprising the following steps:

1) firstly, several flaw detection vehicles are arranged horizontally, and the slider (36) of the left flaw detection vehicle slides to the right in the chute, so that the connecting block (35) is inserted into the connecting port (40) of the right flaw detection vehicle to the right; rotating the no.1 knob (39) drives the no.2 gear (38) to rotate, and the no.2 gear (38) drives two insertion blocks (37) to be inserted into the slot (41) after being extracted from the connecting block (35), so that the connecting block (35) is fixed in the connecting port (40);

2) cover the flaw detection vehicle on the rail so that the no.1 ultrasonic probe (16) sticks to the top side wall of the rail, and then control the double-headed cylinder (15), the no.1 motor (19) and the no.3 motor (28) to run; the double-headed cylinder (15) drives two guiding blocks (14) to move towards each other, and the two guiding blocks (14) are attached to both sides of the rail respectively; the no.1 motor (19) drives the no.1 screw rod (20) to rotate, so that the moving block drives the moving plate (18) to move downwards, and the no.1 wheel (12) is driven to move downwards through the rotating column (17), so that the no.1 wheel (12) abuts on the rail seat; the no.3 motor (28) drives the no.2 screw (29) to rotate, so that the moving block drives the moving column (27) to move up or down, so that the no.2 ultrasonic probe sticks to the seat of the rail; the driving motor (13) drives the no.1 wheel (12) to rotate, so that the no.1 wheel (12) rolls on the rail, so that the no.1 ultrasonic probe (16) continuously detects the rail and the no.2 ultrasonic probe continuously detects the rail seat;

3) take a number of flaw detection vehicles, first press the button (33) of one flaw detection vehicle inward, and drive the connecting column to retract into the no.1 housing (10) through the linkage plate (31); then insert the connector (34) of one flaw detection vehicle into the gap of the adjacent flaw detection vehicle; after that, the button (33) is loosened, and the no.1 spring (32) pushes the connecting column (30) to move outwards through the linkage plate (31), so that the connecting column (30) is inserted into the connector (34), and the two flaw detection vehicles are hinged; a

plurality of flaw detection vehicles are connected in series in a ring shape and sleeved on a pipeline (65); LU506342

4) controlling a plurality of flaw detection vehicles to run synchronously, so that a plurality of no.1 wheels (12) abut against the outer side wall of the pipeline (65), and controlling the no.3 motors (28) of the flaw detection vehicles to run, so that a plurality of no.2 ultrasonic probes are stuck on the outer side wall of the pipeline (65); then, the driving motor (13) drives the no.1 wheel (12) to rotate along the pipeline (65) for one turn, so that the no.2 ultrasonic probe can carry out flaw detection around the pipeline (65); then the no.2 motor (25) runs to drive the driving wheel (26) to rotate, and the driving wheel (26) drives the driven wheel (23) to rotate through the belt (24); the driven wheel (23) drives the no.1 gear (22) to rotate, so that the no.1 gear (22) drives the rotating column (17) to rotate; after the rotating column (17) rotates horizontally, it drives the no.1 wheel (12) to rotate by 90°, so that the no.1 wheel (12) rolls in the direction of the pipeline (65) and carries out flaw detection on the next pipeline (65).

REVENDICATIONS

LU506342

1. Dispositif électromécanique intégré de détection intelligente de défauts, caractérisé en ce que, il comprend un véhicule de détection de défauts et un véhicule d'alimentation électrique ; la structure dudit véhicule de détection de défauts comprend un boîtier n° 1 (10), un mécanisme d'entraînement, un mécanisme de positionnement, un boîtier de circuit (42) et un mécanisme de détection de défauts ; ledit boîtier n° 1 (10) a une structure de boîtier cylindrique en forme de U, une colonne de liaison cylindrique (30) est respectivement disposée dans une encoche au niveau des extrémités avant et arrière d'un bord inférieur droit dudit boîtier n° 1 (10), et un bouton (33) est respectivement disposé dans des trous traversants des parois latérales avant et arrière, une extrémité interne dudit bouton (33) et une extrémité interne de ladite colonne de liaison (30) sont reliées de manière fixe par une plaque de couplage (31), une face interne de la plaque de couplage (31) est pourvue d'un ressort n° 1 (32), un raccord (34) tubulaire est fixé respectivement au niveau des extrémités avant et arrière d'une paroi latérale inférieure gauche dudit boîtier n° 1 (10), et une sonde à ultrasons n° 1 (16) est disposée dans un trou traversant de la paroi latérale supérieure d'une rainure inférieure dudit boîtier n° 1 (10) ; la structure dudit véhicule d'alimentation électrique comprend une plaque de fond (46), et un compartiment de batterie (47) et un ordinateur (48) ; ladite plaque de fond (46) a une structure de plaque rectangulaire, deux roues n° 2 (49) sont respectivement disposées à l'avant et à l'arrière, le compartiment de batterie (47) est fixé sur une paroi latérale supérieure de la plaque de fond (46), ledit ordinateur (48) est disposé sur une paroi latérale supérieure du compartiment de batterie (47).

2. Dispositif électromécanique intégré de détection intelligente de défauts selon LU506342 la revendication 1, caractérisé en ce que, la structure du mécanisme d'entraînement comprend une roue n° 1 (12), une colonne rotative (17), une plaque mobile (18), un moteur n° 1 (19), un engrenage n° 1 (22) et un moteur n° 2 (25) ; ladite roue n° 1 (12) est pourvue d'un support de roue en forme de U inversé (11), ledit support de roue (11) est pourvu d'un moteur d'entraînement (13), le rotor dudit moteur d'entraînement (13) est fixé à un axe de la roue n° 1 (12), et quatre roues n° 1 (12) sont respectivement disposées dans quatre encoches à une partie inférieure du boîtier n° 1 (10) ; ladite colonne rotative (17) a une structure cylindrique, et des motifs de dents en forme de bandes sont disposés sur une paroi latérale externe, quatre colonnes rotatives (17) sont respectivement disposées dans des cavités aux quatre coins du boîtier n° 1 (10), une extrémité inférieure de chaque colonne rotative (17) est respectivement fixée à une extrémité supérieure du support de roue (11) d'une roue n° 1 (12), et l'extrémité supérieure est reliée de manière rotative à la plaque mobile (18) par l'intermédiaire d'un roulement ; ladite plaque mobile (18) a une structure de plaque en forme de caractère chinois « 回 », ladite plaque mobile (18) est disposée dans une cavité supérieure du boîtier n° 1 (10), et une tige de guidage (21) est disposée dans un trou traversant vertical de ladite plaque mobile (18) ; ladite tige de guidage (21) est fixée verticalement dans la cavité supérieure du boîtier n° 1 (10) ; ledit moteur n° 1 (19) est disposé dans la cavité supérieure du boîtier n° 1 (10), une tige à vis n° 1 (20) est fixée au niveau d'une extrémité supérieure du rotor, et un bloc mobile engagé par filet sur ladite tige à vis n° 1 (20) est fixé dans le trou traversant de la plaque mobile (18) ; quatre engrenages n° 1 (22) sont tous disposés dans la cavité supérieure du boîtier n° 1 (10), une roue menée (23) est respectivement disposée au niveau d'une extrémité supérieure de la colonne d'engrenage de chaque engrenage n° 1 (22), et chaque engrenage n° 1 (22) est respectivement engrené avec une colonne rotative (17) ; ledit moteur n° 2 (25) est disposé dans la cavité supérieure du boîtier n° 1 (10), une roue menante (26) est fixée au niveau d'une extrémité supérieure du rotor dudit moteur n° 2 (25), et la roue menante (26) et les quatre roues menées (23) sont reliées par une courroie (24).

3. Dispositif électromécanique intégré de détection intelligente de défauts selon LU506342 la revendication 1, caractérisé en ce que, la structure dudit mécanisme de positionnement comprend deux blocs de guidage (14) et un cylindres à double tête (15), et lesdits deux blocs de guidage (14) sont disposés sur une paroi latérale supérieure de la rainure inférieure du boîtier n° 1 (10) ; ledit cylindre à double tête (15) est disposé sur une paroi latérale inférieure de la cavité supérieure du boîtier n° 1 (10), et deux extrémités dudit cylindre à double tête (15) sont respectivement reliées de manière fixe aux deux blocs de guidage (14).

4. Dispositif électromécanique intégré de détection intelligente de défauts selon la revendication 1, caractérisé en ce que, ledit boîtier de circuit (42) est fixé sur la paroi latérale supérieure du boîtier n° 1 (10), une carte de circuit de commande est disposée dans ledit boîtier de circuit (42), et une interface n° 1 (43), un bouton de commande (44) et une alarme sonore et visuelle (45) sont disposés dans les trous traversants de la paroi latérale, ladite carte de circuit de commande est connectée électriquement au mécanisme d'entraînement, au mécanisme de positionnement et au mécanisme de détection de défauts ; ledit bouton de commande (44) est connecté électriquement à la carte de circuit de commande ; ladite alarme sonore et visuelle (45) est connectée électriquement à la carte de circuit de commande ; ladite interface n° 1 (43) est connectée électriquement à la carte de circuit de commande, et une fiche du câble de données (61) est insérée dans l'interface n° 1 (43).

5. Dispositif électromécanique intégré de détection intelligente de défauts selon la revendication 1, caractérisé en ce que, la structure dudit mécanisme de détection de défauts comprend une colonne mobile (27) et un moteur n° 3 (28), ladite colonne mobile (27) a une structure de boîtier en forme de prisme quadrangulaire, une sonde à ultrasons n° 2 est disposée dans un trou traversant inférieur de ladite colonne mobile (27) ; deux colonnes mobiles (27) sont respectivement disposées dans des rainures des parois latérales avant et arrière du boîtier n° 1 (10) ; deux moteurs n° 3 (28) sont respectivement disposés dans des trous traversants des parois avant et

arrière du boîtier n° 1 (10), une tige à vis n° 2 (29) est fixée au niveau de l'extrémité LU506342 supérieure du rotor de chaque moteur n° 3 (28), et le bloc mobile engagé par filet sur chaque tige de vis n° 2 (29) est relié de manière fixe à une colonne mobile (27) respectivement.

6. Dispositif électromécanique intégré de détection intelligente de défauts selon la revendication 1, caractérisé en ce que, un bloc de liaison (35) est disposé dans une encoche au niveau d'une extrémité droite de la paroi latérale supérieure du boîtier n° 1 (10), des extrémités avant et arrière du bloc de liaison (35) sont respectivement pourvues d'un curseur (36), les deux curseurs (36) sont respectivement insérés dans des goulottes coulissantes des parois latérales avant et arrière de l'encoche au niveau de l'extrémité droite, un bloc d'insertion (37) est respectivement disposé dans des rainures des parois latérales avant et arrière dudit bloc de liaison (35), ledit bloc d'insertion (37) est pourvu de motifs de dents, un engrenage n° 2 (38) est disposé dans une cavité dudit bloc de liaison (35), des extrémités gauche et droite de l'engrenage n° 2 (38) sont respectivement engrenées avec deux blocs d'insertion (37), un bouton-volant n° 1 (39) est disposé sur la paroi latérale supérieure dudit bloc de liaison (35), et le rotor du bouton-volant n° 1 (39) est relié de manière fixe à la colonne d'engrenage de l'engrenage n° 2 (38) ; l'encoche de l'extrémité gauche de la paroi latérale supérieure du boîtier n° 1 (10) est un orifice de liaison (40), et les parois latérales avant et arrière de l'orifice de liaison (40) sont respectivement pourvues de fentes (41).

7. Procédé d'utilisation d'un dispositif électromécanique intégré de détection LU506342 intelligente de défauts selon l'une quelconque des revendications 1 à 6, caractérisé en ce qu'il comprend les étapes suivantes consistant à :

1) prendre d'abord plusieurs véhicules de détection de défauts et les disposer horizontalement, faire glisser le curseur (36) du véhicule de détection de défauts gauche vers la droite dans la goulotte coulissante, de sorte que le bloc de liaison (35) soit inséré vers la droite dans l'orifice de liaison (40) du véhicule de détection de défauts droit, ensuite, faire tourner le bouton-volant n° 1 (39) afin de faire tourner l'engrenage n° 2 (38), l'engrenage n° 2 (38) entraîne deux blocs d'insertion (37) à insérer dans la fente (41) après leur sortie du bloc de liaison (35), de sorte que le bloc de liaison (35) soit fixé dans l'orifice de liaison (40) ;

2) recouvrir le véhicule de détection de défauts sur un rail de manière à ce que la sonde à ultrasons n° 1 (16) adhère à une paroi supérieure du rail ; ensuite, actionner le cylindre à double tête (15), le moteur n° 1 (19) et le moteur n° 3 (28), le cylindre à double tête (15) entraîne deux blocs de guidage (14) qui se déplacent dans des directions opposées, et les deux blocs de guidage (14) sont fixés respectivement de chaque côté du rail ; le moteur n° 1 (19) entraîne la tige à vis n° 1 (20) en rotation, de sorte que le bloc mobile entraîne la plaque mobile (18) vers le bas, et la roue n° 1 (12) est entraînée vers le bas à travers la colonne rotative (17), de sorte que la roue n° 1 (12) bute sur le siège du rail ; le moteur n° 3 (28) entraîne la tige à vis n° 2 (29) en rotation, de sorte que le bloc mobile entraîne la colonne mobile (27) vers le haut ou vers le bas et que la sonde à ultrasons n° 2 adhère au siège du rail ; le moteur d'entraînement (13) entraîne la roue n° 1 (12) en rotation, de sorte que la roue n° 1 (12) roule sur le rail, et que la sonde à ultrasons n° 1 (16) détecte en continu le rail et que la sonde à ultrasons n° 2 détecte en continu le siège du rail ;

3) prendre plusieurs véhicules de détection de défauts, appuyer d'abord sur le bouton (33) d'un véhicule de détection de défauts vers l'intérieur, et faire rentrer la colonne de liaison dans le boîtier n° 1 (10) à travers la plaque de couplage (31) ; ensuite, insérer le raccord (34) d'un véhicule de détection de défauts dans

l'encoche du véhicule de détection de défauts adjacent ; puis, libérer le bouton (33), et le ressort n° 1 (32) pousse la colonne de liaison (30) à se déplacer vers l'extérieur à travers la plaque de couplage (31), de sorte que la colonne de liaison (30) est insérée dans le raccord (34), et que les deux véhicules de détection de défauts sont articulés ; plusieurs véhicules de détection de défauts sont reliés en série en forme d'anneau et manchonnés sur un tuyau (65) ;

4) commander la marche synchronisée de plusieurs véhicules de détection de défauts, de sorte que plusieurs roues n° 1 (12) viennent buter contre la paroi latérale externe du tuyau (65), et commander la marche des moteurs n° 3 (28) de plusieurs véhicules de détection de défauts, de sorte que plusieurs sondes à ultrasons n° 2 adhèrent sur la paroi latérale externe du tuyau (65) ; ensuite, le moteur d'entraînement (13) fait tourner la roue n° 1 (12) le long du tuyau (65) pendant un tour, de sorte que la sonde à ultrasons n° 2 puisse effectuer la détection de défauts autour du tuyau (65) ; puis, le moteur n° 2 (25) entraîne la roue menante (26) en rotation, la roue menante (26) entraîne la roue menée (23) en rotation par l'intermédiaire de la courroie (24), et la roue menée (23) entraîne l'engrenage n° 1 (22) en rotation, de sorte que l'engrenage n° 1 (22) entraîne la colonne rotative (17) en rotation ; après avoir tourné horizontalement, la colonne rotative (17) entraîne la roue n° 1 (12) dans une rotation de 90°, de sorte que la roue n° 1 (12) roule en direction du tuyau (65) et effectue une détection de défauts sur le tuyau suivant (65).

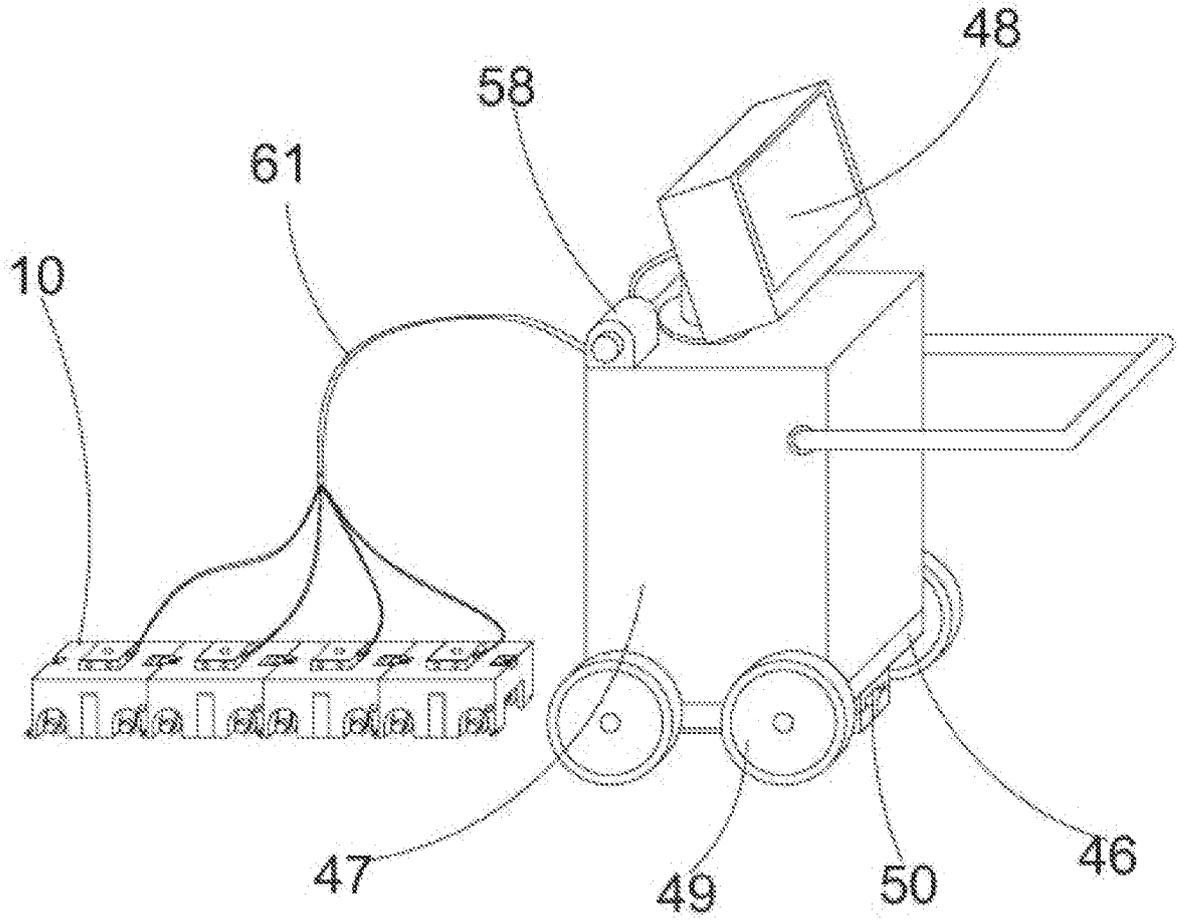


Fig.1

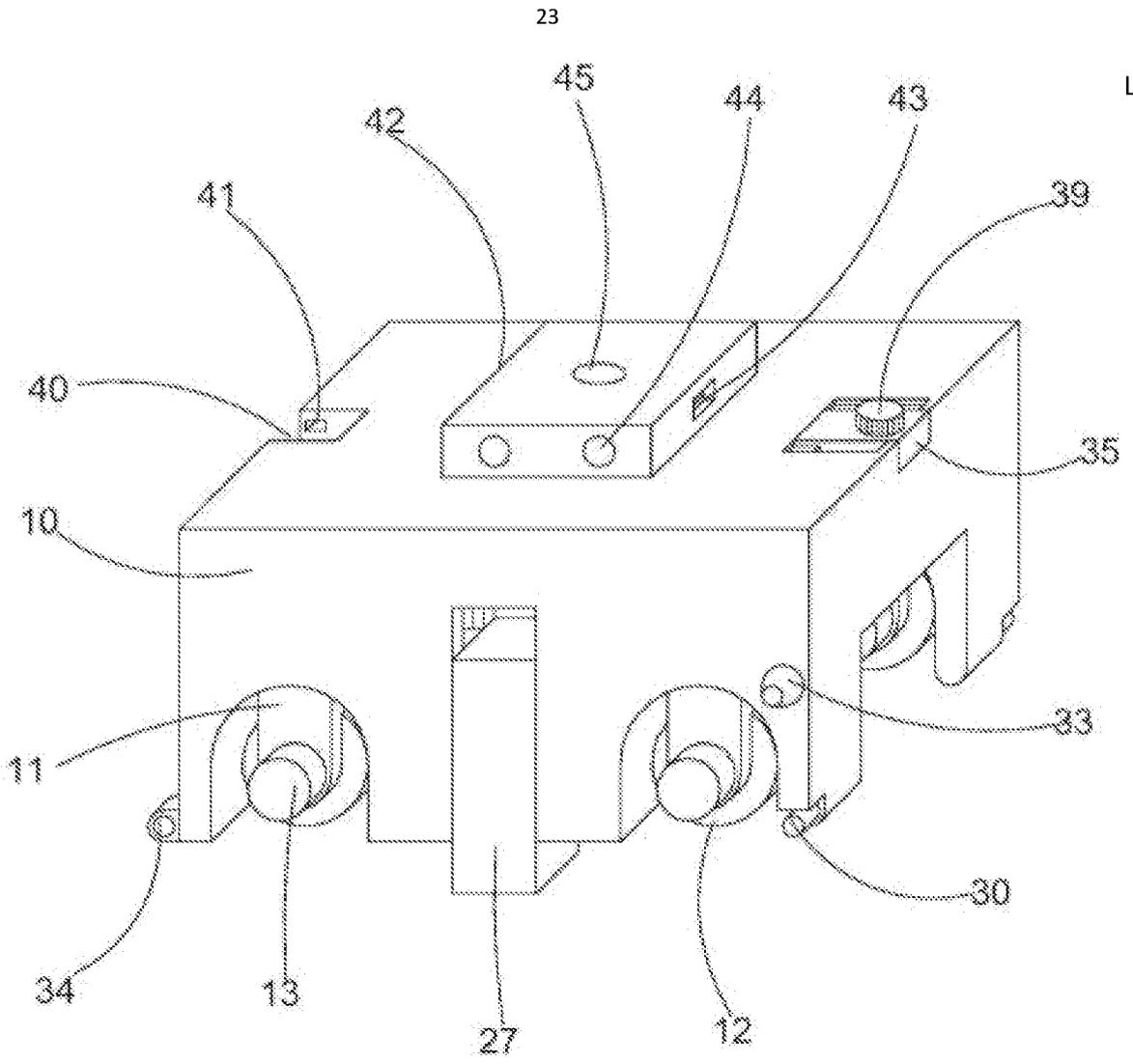


Fig. 2

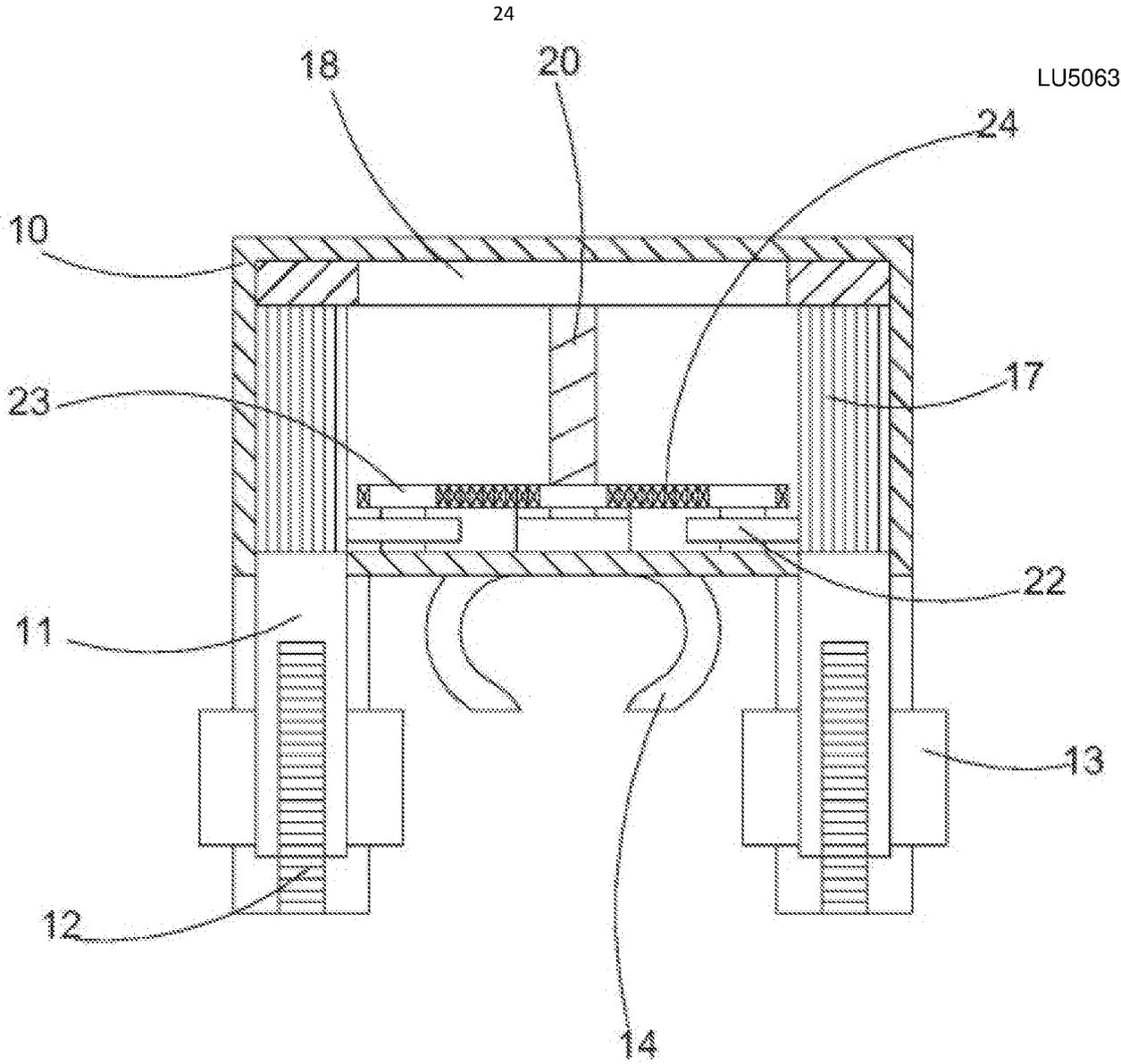


Fig.3

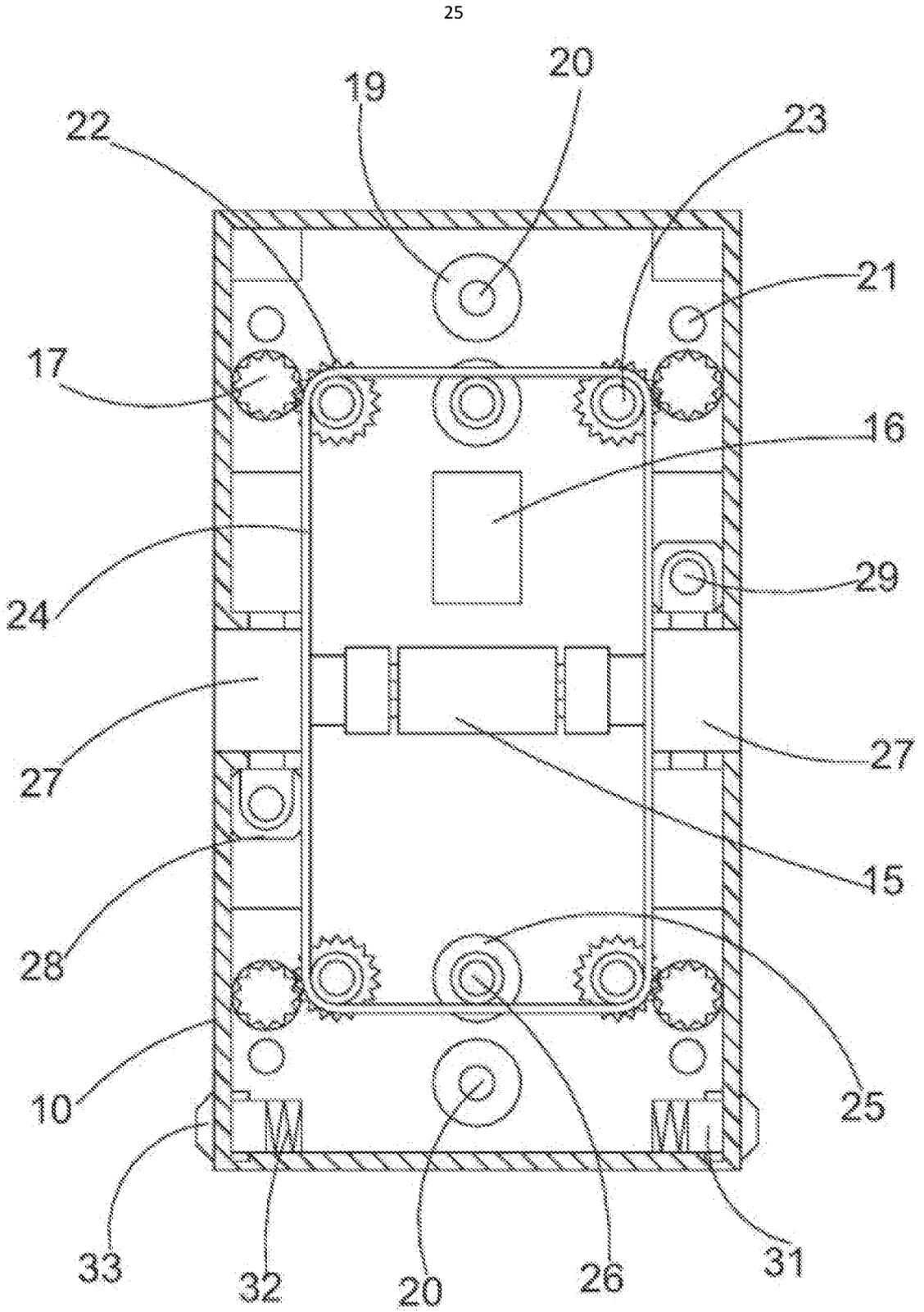


Fig.4

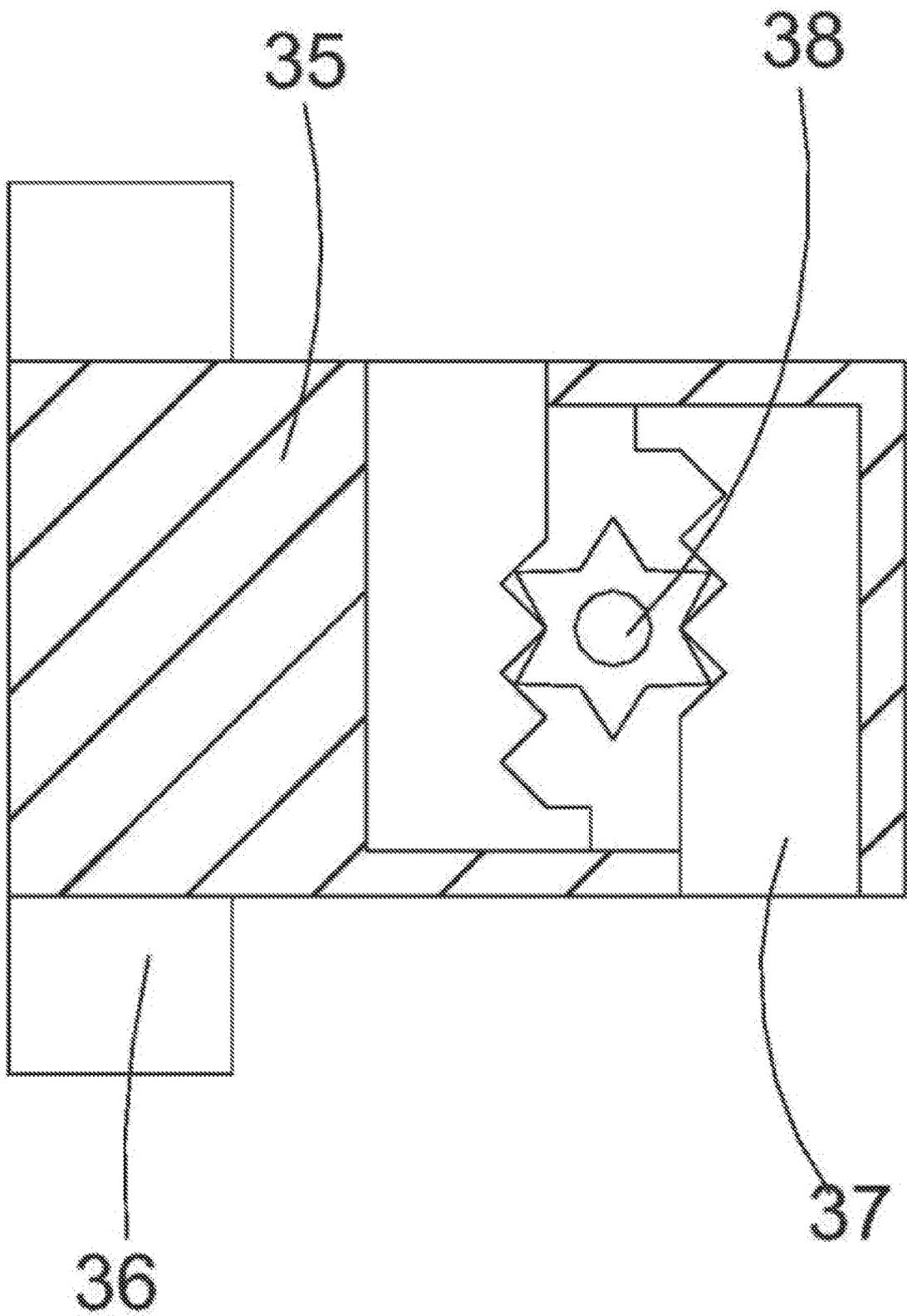


Fig. 5

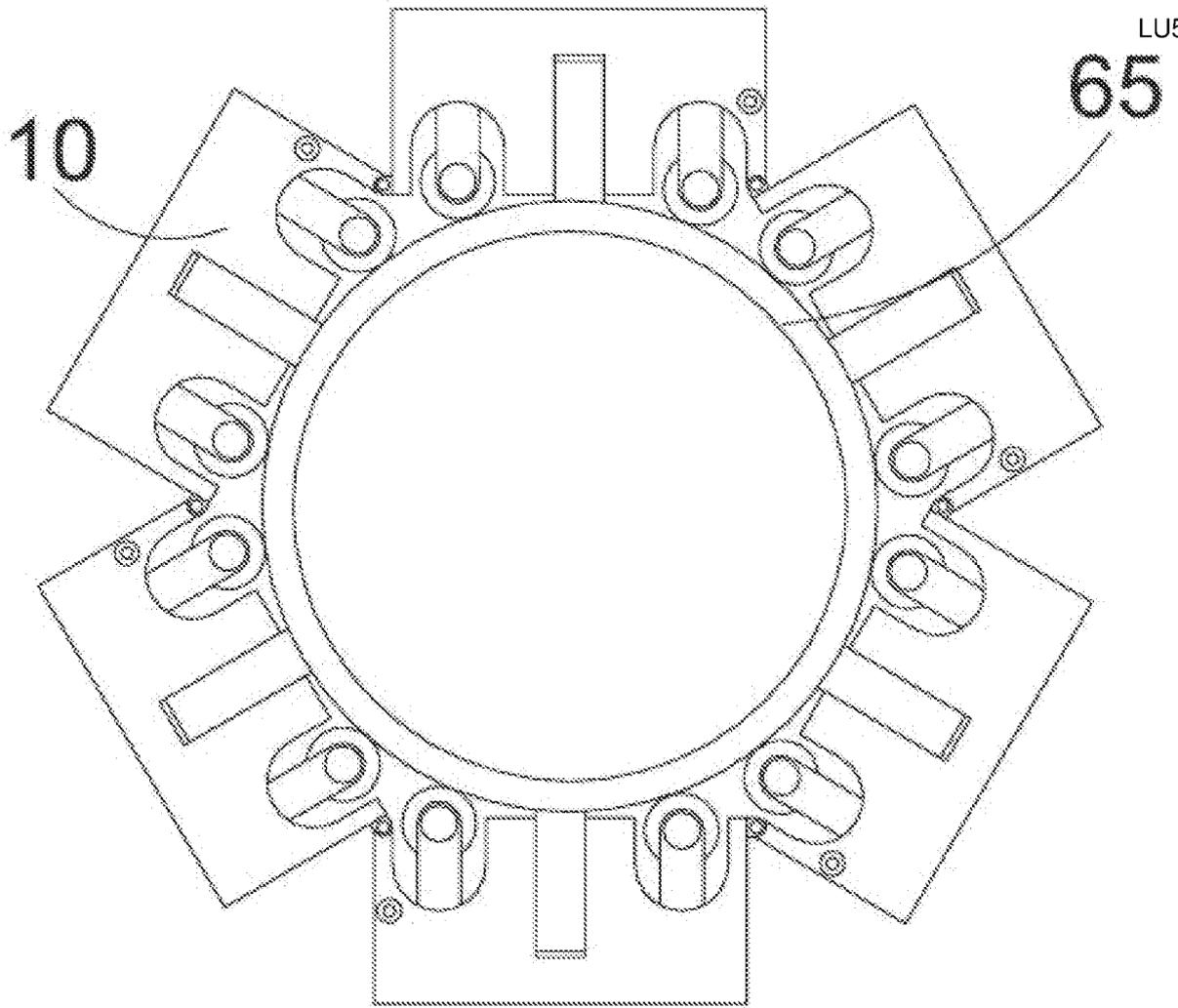


Fig.6

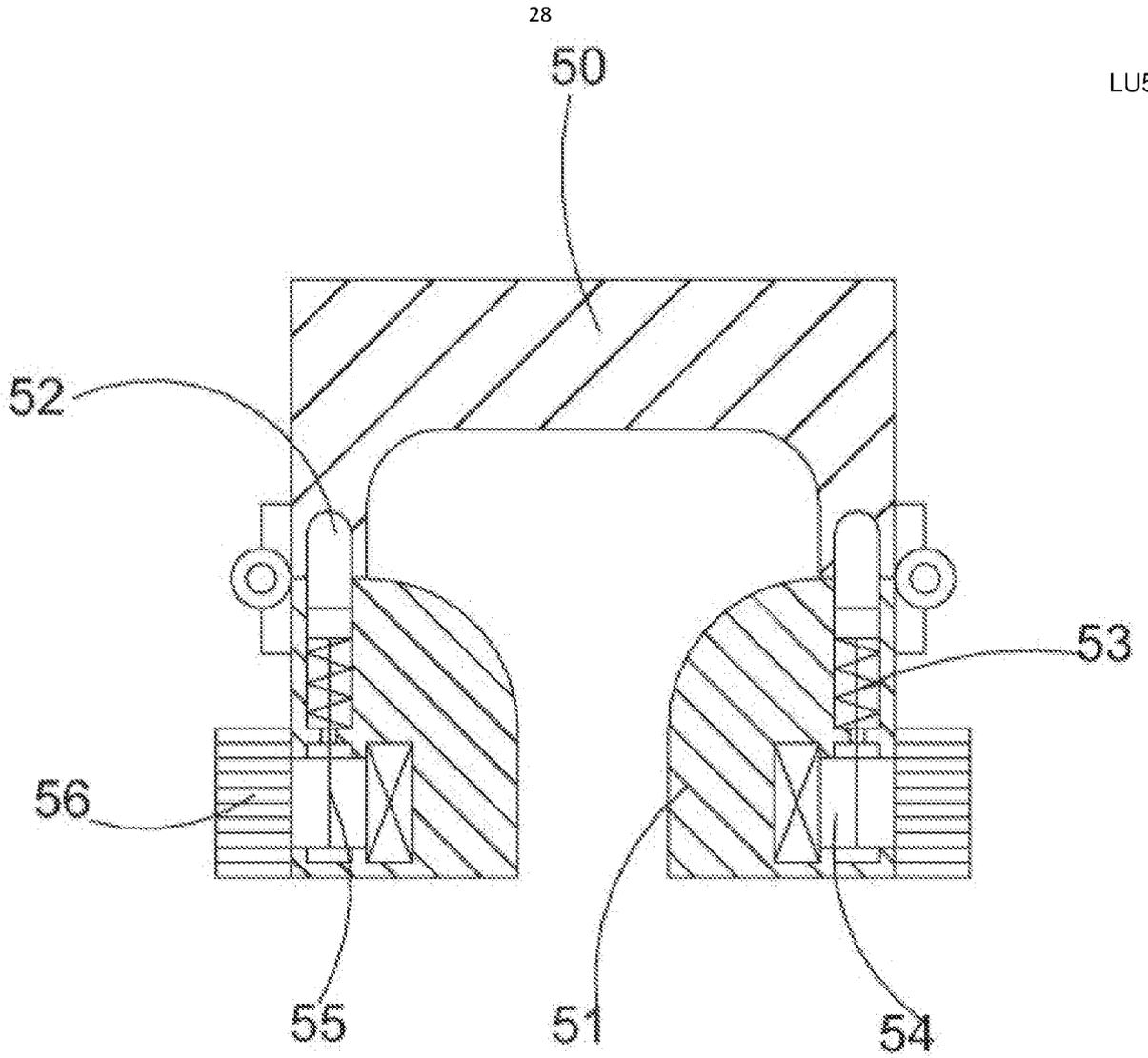


Fig.7

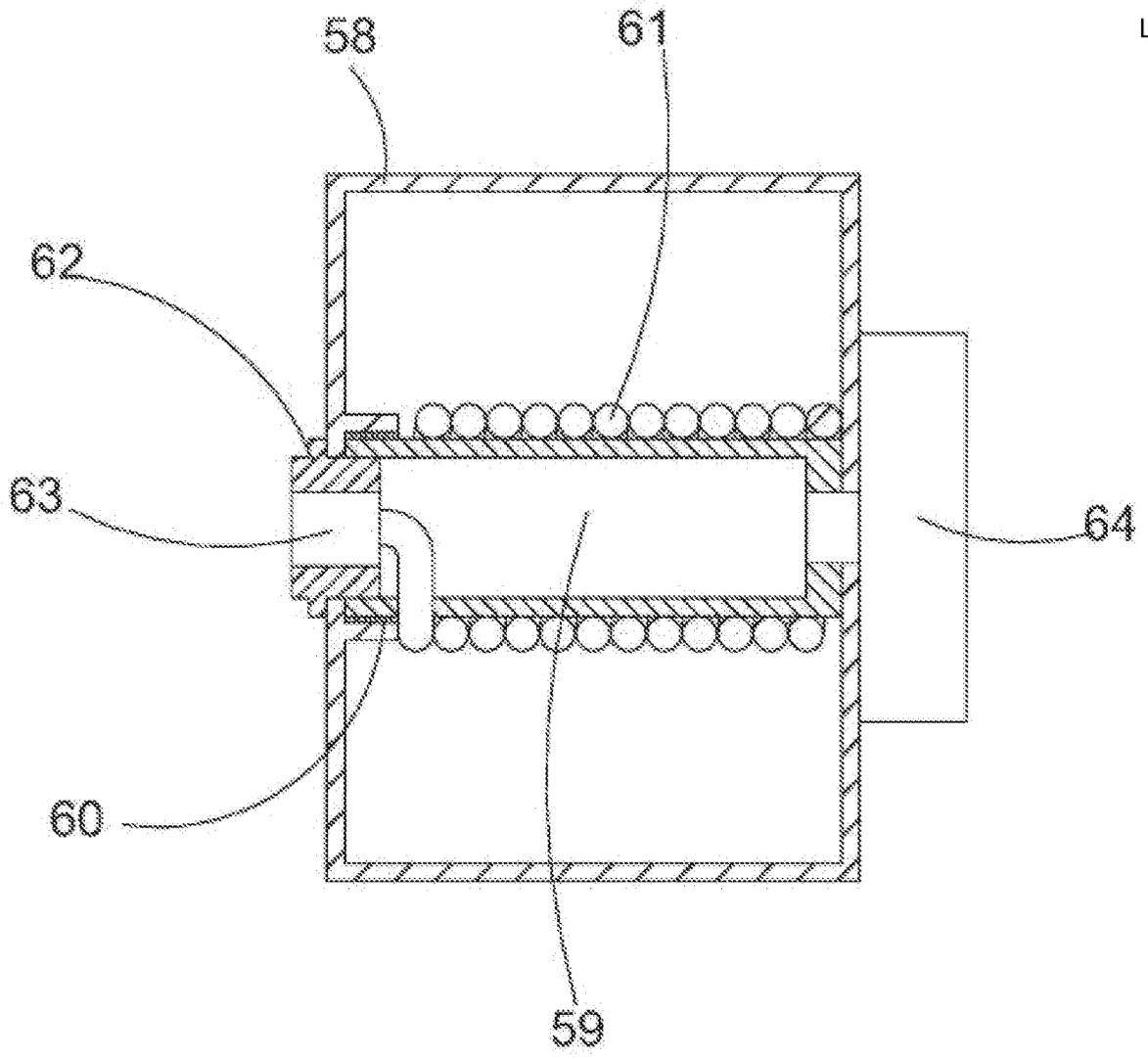


Fig.8