

【DESCRIPTION】

【Invention Title】

GRIPPER DEVICE FOR WIRE LAYING

【Technical Field】

5 The present invention relates to a gripper device for wire laying, and more particularly to a gripper device for wire laying, capable of laying a wire along a preset path by pulling the wire in a cable tray of a ship.

【Background Art】

10 In general, many wires are laid in a shipbuilding process in which large-scale labors are integrated. The wire laying work is deteriorated in productivity due to under significant bad conditions resulting from much manpower, a narrow working place, and a high and deep cable
15 tray. Above all, much manpower is required in the wire laying work, so that the musculoskeletal disorders of workers are increased.

20 To this end, an electric winch, or a feeder has been improved or developed for the use of the wire laying work in each shipyard. However, the versatility of the electric winch or the feeder is degraded due to the characteristic of the wire laying work, so that the utilization thereof is low. In addition, the necessity for the miniaturization and the lightweight of the winch or the feeder is raised.

According to Korean Patent Registration No. 1205921 as the prior art related to the above technology, the whole length including that of a towing unit is increased, so that the installation in a narrow space is difficult.

5 According to Korean Utility Model Registration No. 0454764 as another prior art, the reliability and the durability are deteriorated as a structure is complicated.

 According to Korean Patent Registration No. 0819781 as still another prior art, components are dismantled, one
10 component is fixed to a tray bar, and other components are reassembled. Accordingly, the significant time and cost are required to install a wire laying device.

【Disclosure】

【Technical Problem】

15 In order to solve problems occurring in the related art, an object of the present invention is to provide a gripper device for wire laying, which can be easily and efficiently used even in a narrower space due to a simple structure and easy installation thereof, and has a structure that can be
20 easily moved and used due to the lightweight thereof.

 Another object of the present invention is to automatically moving forward a wire in reciprocating movement with a function of guiding the wire.

 Still another object of the present invention is to
25 improve grasping force regardless of the manufacturing

error of an outer diameter of a wire so that the transfer of the wire can be exactly and smoothly performed.

【Technical Solution】

In order to accomplish the above objects, there is a gripper device for wire laying, which applies laying force to transfer a wire along a preset path. The gripper device includes a movable body having a link movable in a forward/backward direction of the wire and a gripping unit having a gripper to grip the wire in linkage with the link.

According to the detailed configuration of the present invention, the link of the movable body is moved together with the wire only in one-way movement.

According to another embodiment of the present invention, there is provided a gripper device for wire laying, which includes a base, a gripping unit that couples an upper member and a lower member to the base by a link structure, and has timing belts provided on the lower and upper member, and an actuator to make reciprocating movement of the gripping unit.

According to the detailed configuration of the present invention, a wire makes contact with three points of two timing belt of the lower member of the gripping unit and one timing belt of the upper member.

According to the detailed configuration of the present invention, the timing belts of the gripping unit are

provided therein with one-way bearings to restrict one direction rotation.

According to the detailed configuration of the present invention, the upper member of the gripping unit is coupled
5 to the lower member by providing a locking rod and a knob between the upper member and the lower member such that opening force, closing force, and fastening force are varied.

According to still another embodiment of the present
10 invention, there is provided a gripper for wire laying. The gripper includes a housing having a predetermined length and a predetermined width, an operating cylinder to reciprocate in one direction inside the housing, and a gripping unit having a clamp fixed thereto, the clamp
15 rotating in a direction opposite to a moving direction of the cylinder.

According to the detailed configuration of the present invention, the gripping unit includes support bars fixed with a predetermined height to both sides of the gripping
20 unit and a frictional shoe to rotate at an angle within a predetermined range between the support bars.

In this case, the frictional shoe is eccentrically fixed to upper portions of the support bars, and has a frictional surface protruding in an oval shape such that
25 the wire is moved by frictional force.

According to still another embodiment of the present invention, there is provided a gripper device for wire laying. The gripper device includes a fixing ring having a longitudinally cutting portion to surround and fix an outer circumferential surface of a wire to be laid, at least one gripper fitted into the fixing ring, a roller fixed to the gripper rotatably by a roll shaft to make contact with the outer circumferential surface of the wire, and an one-way bearing installed in the gripper to rotate the roll shaft only in one direction and to prevent the roll shaft from being rotated in an opposite direction.

According to the detailed configuration of the present invention, a coupling member is installed at a cutting end portion of the fixing ring to perform a locking operation and a releasing operation in a hooking manner such that a radius of the fixing ring is varied.

According to the detailed configuration of the present invention, the gripper has an H shape, and two roll shafts and two rollers are provided with respect to one gripper, and provided symmetrically to each other.

According to still another embodiment of the present invention, there is provided a gripper device for wire laying. The gripper device includes a movable body to support a lower portion of an outer circumferential surface of a wire, first and second guide rings rotatably hinged to

both ends of the movable body, mutually coupled to each other to surround the wire, and having inclined surfaces formed at portions of inner circumferential surfaces thereof, the inclined surfaces being inclined downward in a moving direction of the wire, first and second gripper cars having inclined surfaces corresponding to the inclined surfaces and fitting-assembled to form a wedge-shaped assembly structure, one-way bearings mounted on the movable body and the first and second gripper cars, and a roller shaft-fixed to a longitudinally intermediate portion of the one-way bearing to make contact with the outer circumference surface of the wire.

According to the detailed configuration of the present invention, a coupling bolt and a coupling nut are provided at mutually facing end portions of the first and second guide rings such that the coupling bolt and the coupling nut are coupled to each other.

According to the detailed configuration of the present invention, a pair of one-way bearings are grouped and provided at both of front and rear end portions of the movable body and the first and second gripper cars.

According to still another embodiment of the present invention, there is provided a gripper device used when laying a wire. The gripper device includes an actuator to linearly reciprocate within a predetermine stroke, and a

gripping unit mounted on a top surface of a front end of the actuator to move the wire by the stroke while changing an engagement state with the wire according to moving directions of the actuator.

5 According to the detailed configuration of the present invention, the actuator includes a housing, a guide rail protruding in a longitudinal direction from a top surface of the housing, an operating plate sliding along the guide rail, a movable body fixed to a front end of the housing to
10 linearly reciprocate with a predetermined stroke, a coupling bracket to transfer moving force of the movable body to the operating plate and to guide the operating plate such that the operating plate linearly reciprocates with a stroke range of the movable body.

15 According to still another embodiment of the present invention, the gripping unit includes a base fixed to a top surface of a front end of an operating plate, support blocks protruding from both sides of a top surface of the base, each support block having a top surface, which is
20 recessed in an arc shape, and provided at one side thereof with a ring bracket, a stopper protruding from the arc-shaped recessed portion of the support block, an arc-shaped grip link having a pair of rotation rings rotationally mounted in the arc-shaped recessed portion of the support
25 block, an elongated stopper groove formed in the rotation

ring such that the stopper is detachably inserted into the elongated stopper groove, and a link fixing pin passing through the ring bracket and the rotation ring to serve as a rotation shaft and provided at one end thereof with a holder into which a portion of the grip link is fitted.

【Advantageous Effects】

As described above, according to the present invention, in the wire laying work, miniaturization and lightweight are possible, so that the installation in a narrow space is easy, the use is convenient, the reliability is increased, and the maintenance is easily performed.

In addition, when the diameter of the wire is varied, only some components can be simply replaced with new ones, so that the utilization can be enlarged.

【Description of Drawings】

FIG. 1 is a view showing the structure of a laying device according to the present invention.

FIG. 2 is a schematic view showing a main component of FIG. 1.

FIG. 3 is a schematic view showing the installation state of a gripper for wire laying according to the present invention.

FIG. 4 is an exploded perspective view showing the gripper of FIG. 3.

FIG. 5 is an exploded perspective view showing the main component of the gripper.

FIGS. 6 to 9 are perspective views showing the operating state of the gripper of FIG. 3.

5 FIG. 10 is a perspective view showing a gripper for wire laying according to another embodiment of the present invention.

FIG. 11 is a perspective viewing the rotation state of the clamp of the gripper shown in FIG. 10.

10 FIG. 12 is a front view the state that the wire is moved by the gripper of FIG. 10.

FIG. 13 is a perspective view showing the state that an operating cylinder of FIG. 10 is moved forward.

15 FIG. 14 is a perspective view showing the state that an operating cylinder of FIG. 10 is moved backward.

FIG. 15 is a perspective view showing a gripper for wire laying according to still another embodiment of the present invention.

20 FIG. 16 is a view showing an installation state of the gripper of FIG. 15.

FIG. 17 is a perspective view showing a gripper for wire laying according to still another embodiment of the present invention.

25 FIGS. 18 and 19 are a front view and a plan view of FIG. 17, respectively.

FIG. 20 is a schematic view showing an operating example of the gripper of FIG. 17.

FIGS. 21 and 22 are perspective views showing a gripper for wire laying according to still another embodiment of the present invention.

FIG. 23 is an exploded view showing the structure of a main component of the gripper device of FIG. 21.

FIG. 24 is a view showing the operating state of the gripper device of FIG. 21.

10 **【Best Mode】**

【Mode for Invention】

The embodiment of the present invention will be described in detail with reference to accompanying drawings.

FIG. 1 shows a device for laying a wire 150 by applying wire laying force onto a present path. As shown in FIG. 1, in the case of a ship, a cable tray 100 to support the wire 150 has a narrow and complex structure, and is provided in a horizontal, vertical, or curved shape at a high position. A device 160 for wire laying according to the present invention aims at a ship having an interior installation environment and a cable tray 100 of an offshore plant, but the present invention is not limited thereto.

The device 160 for wire laying according to the present invention includes a movable body 210, a gripping unit 300, and a driving unit 400 as main components. The movable body

210 has a structure of having a link 220 movable in a forward/backward direction of the wire 150. The link 220 of the movable body 210 moves together with the wire 150 only in one-way movement. A hinge shaft 223 is detachably
5 installed to couple the movable body 210 to the link 220 as at least one of a splitting pin, a snap ring, and a key is interposed between the movable body 210 and the link 220. The gripping unit 300 according to the present invention has a gripper 310 to grip the wire 150 in linkage with the
10 link 220. The driving unit 400 according to the present invention induces the movement of the link 220 and the gripper 310 to apply laying force to the wire 150. The driving unit 400 employs at least one of a hydraulic cylinder, a pneumatic cylinder, and an electric actuator,
15 and includes a control unit 500 to make reciprocating movement of the driving unit 400 for wire laying at a predetermined period.

FIG. 3 shows a device for laying the wire 150, particularly, a gripper-type device. When the gripper-type
20 device is used, the wire 150 can be easily laid in a cable path, such as a cable tray of the ship, having a narrow space. The wire 150, which has a large diameter, aims at a large-scale wire, but the embodiment is not limited thereto.

According to the present invention, a base 211 is
25 provided. The base 211 supports a lower member 321 of the

gripping unit 300 while being fixed to an actuator 450 by a bolt. The base 211 may be formed by cutting a stainless steel, or by die-casting an aluminum alloy.

In addition, according to the present invention, the
5 gripping unit 300, which includes timing belts 333 provided on the lower member 321 and the upper member 322, couples the lower and upper members 321 and 322 to the base 211 by a link structure. The lower and upper members 321 and 322 make contact with the wire 150 to receive the laying force,
10 and are coupled to each other in a link structure having a band shape by interposing a plurality of intermediate members 323 between the lower and upper members 321 and 322. The lower member 321, which has a Y-shaped section, is coupled to the base 211, the upper member 322, which has a
15 linear-shaped section, is coupled to both side portions of the base 211, and the intermediate member 323 has a linear-shaped section or an inverse L shaped section to be interposed. The lower member 321 and the upper member 322 include timing belts 333 formed of abrasion resistance
20 resin to increase the friction force to the wire 150. The timing belts 333 are provided on support shafts 325 formed on the lower and upper members 321 and 322.

According to the present invention, the actuator 450 is coupled to the gripping unit 300 to make reciprocating
25 movement. The actuator 450 may employ a hydraulic cylinder,

a pneumatic cylinder, or a linear motor. As shown in main drawings of the present invention, an operating cylinder is mounted on a housing 452.

Through the detailed structure of the present invention,
5 the wire 150 makes contact with the gripping unit 300 at three points of two timing belts 333 of the lower member 321 of the gripping unit 300 and one timing belt 333 of the upper member 322. If only two-point support is made by mounting timing belts 333 at both symmetrical positions of
10 the lower member 321, the gripping force is not sufficiently provided to the wire 150. Accordingly, the three-point support manner is employed by further providing the timing belt 333 of the upper member 322. The three-point support manner does not mean a point-contact manner,
15 but linear-contact is actually made.

Through the detailed structure of the present invention, a one-way bearing 335 is provided in the timing belt 333 of the gripping unit 300 to restrict one direction rotation. As shown in FIG. 5, a pulley 331 is coupled to the support
20 shaft 325 by mounting the one-way bearing 335 and a spacer 337 on the support shaft 325. The pulley 331 is toothed with the timing belt 333. Accordingly, the one direction rotation of the timing belt 333 is restricted to transfer the laying force, and opposition direction rotation is
25 allowed to cancel the laying force.

Through the detailed configuration of the present invention, the upper member 322 of the gripping unit 300 is coupled to the lower member 321 by interposing a locking rod 326 and a knob 328 between the upper member 322 and the lower member 321 so that opening, closing, and clamping force may be varied. One upper member 322 is provided therein with a groove, and the locking rod 326 is installed in the opposite upper member 322 so that the locking rod 326 is engaged with the groove. The knob 318 is installed at an end portion of the locking rod 326 to be gripped by one hand of the user, and a spring 338 is mounted on the lower end of the locking rod 326 to maintain the engagement. Accordingly, the user may open the upper and lower members before and after the wire laying work or close the upper and lower members in the wire laying work by holding the knob 328 to introduce the locking rod 326 into the groove, or withdraw the locking rod 326 from the groove in the state

Although not shown, if the length of the locking rod 326 is varied as the knob 328 is rotated, the diameter of the gripping unit 300 may be adjusted or the clamping force of the gripping unit 300 may be varied corresponding to the thickness of the wire 150.

Through the detailed configuration of the present invention, the gripping unit 300 may be rotatably coupled

to the base 211 by providing a rotational shaft 215 on the base 211. If the lower member 321 of the gripping unit 300 is rotatably coupled to the rotational shaft 215 of the base 211, the lower member 321 of the gripping unit 300 can
5 reduce laying resistance in cooperation with the wire 150.

Regarding the operation, as shown in FIG. 6, the upper member 322 is open, the wire 150 is placed on the lower member 321, the upper member 322 is closed, and the knob 328 is clamped, so that the closing state is maintained. In
10 FIG. 7, if an operation cylinder 455 starts to finely move forward, the rotation of the one-way bearing 335 is restricted, so that pressure is increased through the timing belt 333. In FIG. 8, in the state that the wire 150 is gripped by the gripping unit 300, the operating cylinder
15 455 moves forward to apply the laying force to the wire 150 and to pull the wire 150. As shown in FIG. 9, since the operating cylinder 455 moves backward to allow the rotation of the one-way bearing 335, force is slightly applied to the wire 150, so that the wire 150 is maintained in a
20 present state.

As shown in FIG. 3, a plurality of grippers are installed at a preset interval along the laying path of the wire 150. The operating cylinder 455 is repeatedly moved forward and backward, and the laying force is applied to
25 the wire 150 only in the movement forward, so that the wire

150 is pulled. Although the grippers must be synchronized with each other, the exact synchronization between the grippers is not required through a pneumatic manner employing the pneumatic cylinder.

5 The gripper according to the present invention has a simple structure and hardly causes slip loss. In addition, the gripper can smoothly perform a laying operation on a vertical tray.

10 As shown in FIG. 10, the gripper for wire laying includes a housing 212 having a predetermined length and a predetermined width, the operating cylinder 455 to reciprocate in one direction inside the housing 212, and the gripping unit 300 having a frictional shoe 343 fixed thereto and rotating in a direction opposite to the moving
15 direction of the operating cylinder 455.

20 As shown in FIG. 10, the housing 212 according to the present invention is provided in the shape of a rectangle having a predetermined length and a predetermined width, a top surface of the housing 212 is open so that the operating cylinder 455 is installed in the housing 212, and one lateral surface of the housing 212 is open so that a piston rod 456 of the operating cylinder 455 protrudes.

25 As shown in FIGS. 10 to 12, protrusions 213 protrude from both lateral sides of the housing 212 by the length of the protrusions 213. The protrusions 213 protrude for

stable placing of the cable tray (not shown), and a fixing member 214 is coupled to the protrusion 213 so that the fixing member 214 is fixed to the cable tray (not shown) through a hole formed in the cable tray.

5 In addition, a support roller 217 is rotatably fixed to the top surface of the protrusion 213. The support roller 217 stably supports the wire 150. The operating cylinder 455 coupled to the piston rod to reciprocate by pneumatic pressure is mounted in the housing 212. In the operating
10 cylinder 455, the piston rod 456 reciprocates in one direction by the pneumatic pressure through the device for wire laying. Since the operating cylinder 455 includes a typical cylinder, the details thereof will be omitted.

 In addition, the gripping unit 300 having the
15 frictional shoe 343 rotatably fixed thereto to move the wire in one direction is fixed to one top surface of the operating cylinder 455.

 FIG. 11 is a perspective view showing the rotation state of the clamp of the gripper for wire laying according
20 to the present invention.

 As shown in FIGS. 10 and 11, the gripping unit 300 includes support bars 341 vertically fixed while being spaced apart from each other by a predetermined distance, a circular arc surface 342 interposed between the support
25 bars 341 and allowed a cable to be mounted thereon, and the

frictional shoe 343 rotatably fixed between the support bars 341. The support bars 341 are vertically fixed while being spaced apart from each other by a predetermined distance, and the circular arc surface 342 is formed between the support bars 341 lower than the support bars 341 and allowed the wire 150 to be mounted thereon. The frictional shoe 343 is rotatably fixed to the upper portion of the support bar 341.

The frictional shoe 343 is rotated in a direction opposite to the moving direction of the operating cylinder 455 to keep pressing the wire 150 while moving the wire 150 in the moving direction of the operating cylinder 455. The frictional shoe 343 is formed in a substantial heart shape to move the wire 150, and formed at one side thereof with the frictional surface 344 protruding in an oval shape to press the wire 150.

Hereinafter, the coupling relationship of the gripper for wire laying according to an exemplary embodiment of the present invention will be described in detail.

As shown in FIGS. 10 to 12, the housing 212 has the top surface and one lateral surface, which are open, so that the operating cylinder 455 is embedded in the housing 212, and the protrusions 213 protrude from both longitudinal lateral sides of the housing 212 by a predetermined length. The fixing member 214 is coupled to the protrusions 213 to

fix the housing 212 to the cable tray (not shown), and the support rollers 217 are rotatably fixed to the protrusions 217 to stably support the wire 150.

5 The operating cylinder 455 is mounted in the internal space of the housing 212. The operating cylinder 455 is operated by the pneumatic pressure, and the piston rod 456 reciprocates in a longitudinal direction. The gripping unit 300 is fixed at one side of the top surface of the operating cylinder 455. The support bars 341 are vertically
10 fixed to both sides of the top surface of the operating cylinder 455. The circular arc surface 342 is formed between the support bars 341 lower than the support bars 341 so that the wire 150 is stably mounted on the circular arc surface 342.

15 In addition, the frictional shoe 343 having the heart shape is rotatably fixed to the upper portions of the support bars 341, and fixed to the support bars 341 eccentrically to one side. Accordingly, the frictional shoe 343 may be rotated at an angle within a predetermined angle
20 range according to the movement of the operating cylinder 455 to press the wire 150 while moving the wire 150. In addition, the frictional shoe 343 is formed at one side thereof with the frictional surface 344 protruding in an oval shape to generate frictional force.

Referring to FIGS. 13 and 14, the operating method of the gripper for wire laying will be described in detail according to exemplary embodiments of the present invention.

As shown in FIGS. 13 and 14, the housing 212 is fixed
5 onto the cable tray (not shown) in the state that the operating cylinder 455 is mounted in the housing 212. The housing 212 is fixed onto the cable tray by placing the protrusions on crossbars (not shown) of the cable tray and coupling the fixing members 214 to the crossbars and the
10 protrusions 213. In other words, the housing 212 is fixed onto the cable tray so that the housing 212 is not moved.

A plurality of grippers for wire laying are fixed onto the cable tray at a predetermined interval. Preferably, the grippers are applied to horizontally move the wire 150.

15 In addition, the wire 150 to be moved is inserted into the gripping unit 300. The wire 150 is interposed between the circular arc surface 342 and the frictional shoe 343.

In the state that the wire 150 is inserted into the gripping unit 300, the operating cylinder 455 installed in
20 the gripper is operated according to a control signal.

As shown in FIG. 13, if the operating cylinder 455 is moved forward in a left direction of the drawing, the gripping unit 300 fixed to the operating cylinder 455 is moved in the same direction as that of the piston rod 456.
25 As the operating cylinder 455 is moved forward, the support

bar 341 is moved in the same direction as that of the operating cylinder 455. The frictional surface 344 of the frictional shoe 343 to press the wire 150 is rotated in a direction opposite to the moving direction of the operating
5 cylinder 455 so that the wire 150 is pressed at predetermined pressure.

In this case, the frictional shoe 343 is rotated only at a predetermined angle to strongly press the wire 150. The wire 150 is maintained in the pressing state by the
10 circular arc surface 342 and the frictional shoe 343. As described above, as the frictional shoe 343 is rotated, the wire 150 is moved in the same direction as the moving direction of the operating cylinder 455 in the state that the wire 150 is pressed between the circular arc surface
15 343 and the frictional surface 344.

Meanwhile, when the operating cylinder 455 is moved backward, since the frictional shoe 343 is eccentrically fixed to the support bar 341, the frictional shoe 343 is reversely rotated. In this case, the frictional shoe 343 is
20 reversely rotated in the state that the frictional surface 344 presses the wire 150 to release the pressing state of the wire 150.

In other words, when the frictional shoe 343 is reversely rotated, the frictional shoe 343 is rotated at a
25 predetermined angle in the state of making simple contact

with the wire 150, and the wire 150 is not pressed by friction. Accordingly, the operating cylinder 455 is moved backward without moving the wire 150.

When the operating cylinder 455 is moved forward as
5 described above, the wire 150 is moved in one direction (which is a target direction). When the operating cylinder 455 is moved backward, the wire 150 is maintained at the position thereof without moving. Accordingly, when the operating cylinder 455 is moved forward, the wire 150 is
10 moved by a predetermined distance through the operating cylinder 455 after pressed by the frictional shoe 343.

Accordingly, as the operating cylinder 455 is moved forward, the wire 150 is repeatedly moved by a predetermined distance (the forward distance of the
15 cylinder) in a target direction, so that the wire 150 may be laid.

As shown in FIGS. 15 and 16, the cable gripper according to the present invention is mounted in a power unit to reciprocate, so that the wire 150 may be
20 automatically moved forward in the reciprocating movement. In particular, the gripper is configured to reduce the frictional force with the wire 150 and the gripper when the gripper is returned to an initial driving position using the one-way bearing 335 and the roller.

In addition, the grippers are installed in parallel, or in series to reduce torque applied to the one-way bearing 335 of an individual gripper when the grippers are transferred, so that miniaturization may be achieved.

5 Further, since the wire 150 is moved in one direction, the wire 150 is not moved backward when the wire 150 is laid vertically. In addition, since there is no resistance in a forward direction of the wire, even if a winch is used for the front end of the wire, the winch may serve as a
10 wire guide.

In addition, when a coupling member 352 to guide the gripper is manufactured in a hooking structure similar to a handcuff structure, the coupling member 352 may adjust pressure applied to the wire 150 and may be used regardless
15 of the thickness of the wire 150.

In addition, the size and the number of the grippers may be adjusted depending on the size of the wire 150. In addition, the grippers are slightly modified to be effectively used in a manual wire laying work. Preferably,
20 three grippers 310 may be installed at an angle of 120° along the circumference of the wire 150. Although the grippers 310 may have various shapes, the grippers 310 may be preferably formed in an H shape in terms of stability.

Although the gripper 310 is shown in an H shape, the
25 scope of the present invention is not limited thereto. In

the gripper 310 having the H shape, two roll shafts 356 and two rollers 354 are symmetrically provided with respect to one gripper 310.

In addition, the roll shaft 356 is fitted into a
5 portion of the gripper 310, and the roller 354 is rotatably mounted on the roll shaft 356. In this case, the roller 354 has a diameter greater than that of the gripper 310, so that the roller 354 may make contact with the wire 150 instead of the gripper 310 when the gripper 310 is mounted
10 on the wire 150.

Further, six rollers 354 are installed in total while two rollers 354 are grouped into one group. Although description has been made in that three grippers 310 are installed according to an exemplary embodiment, the
15 grippers 310 may be installed in various numbers depending on the diameter of the wire 150. The number of the grippers 310 may be changed within the technical scope of the present invention.

In addition, the one-way bearing 335 is installed in
20 the gripper 310. The one-way bearing is a well-known unit to rotate the roll shaft 356 only in one direction and to prevent the roll shaft 356 from being rotated in an opposite direction by controlling the rotation direction of the roll shaft 356.

In other words, the one-way bearing 335 means a well-known bearing to rotate only in one direction to transfer power so that the bearing engaged with a shaft is rotated together with the shaft in one of both rotation directions when one shaft is made using two shafts, and only the shaft is rotated when the shaft is rotated in the opposite direction. Since the structure of the one-way bearing 335 of generally known to those skilled in the art, the details thereof will be omitted. In drawings, an outer appearance constituting a portion of the gripper 310 will be designated as the one-way bearing 335 for the explanation.

In addition, the gripper 310 is fitted on a fixing ring 350 to move in a radial direction of the fixing ring 350 along the fixing ring 350. A portion of the fixing ring 350 is cut, and the coupling member 352 having the above-described handcuff structure is mounted in the cut portion.

In other words, the coupling member 352 serves as a kind of a fixing member, fixing hooks (not shown) having a predetermined length are formed in both cut portions of the gripper 310, locking hooks (not shown) that serve as a ratchet, that is, are elastically supported by a spring are provided in both inner diameters of the coupling member 352. Accordingly, when both ends of the gripper 310 are introduced into the coupling member 352, the hooking is not performed. When both ends of the gripper are withdrawn from

the coupling member 352, the hooking is achieved for the coupling. In addition, when the hooking is released, the hooking state is released by pressing a knob, which is additionally provided, so that both ends of the gripper may
5 be withdrawn.

In the wire gripper according to the present invention having the above structure, the one-way bearing 335 is operated in the forward direction of the wire 150, thereby fixing the roll shaft 356. Accordingly, the roller 354 is
10 not rotated. In this case, the friction is extremely caused between the roller 354 and the wire 150, so that the roller 354 may be moved together with the wire 150. On the contrary, when the gripper according to the present invention is moved in the backward direction of the wire
15 150, the one-way bearing 335 is not operated, so that the roll shaft 356 is not fixed. Accordingly, the roller 354 is smoothly rotated to make rolling-contact with the surface of the wire 150. In this case, only the gripper can be moved.

As shown in FIG. 17, the one-way bearing 335 is mounted
20 on a movable body 210 and first and second gripper cars 311 and 312 according to the present invention to rotate in one direction, and not rotate in an opposite direction. The movable body 210 may be positioned under a circumference of
25 the wire 150. A first guide ring 382 and a second guide

ring 384 constituting a gripper car guide ring 380 are rotatably hinged to both ends of the movable body 210.

In other words, regarding the gripper car guide ring 380, first and second guide rings 382 and 384, which are
5 separated from each other, are combined with each other to surround the wire 150, and the combination of the first and second guide rings 382 and 384 forms one gripper car guide ring 380.

In addition, coupling bolts 386 and coupling nuts 387
10 are provided at mutually facing end portions of the first and second guide rings 382 and 384 and coupled to each other, so that the first and second guide rings 382 and 384 are coupled to each other to completely surround the outer circumference surface of the wire 150.

In addition, the facing end protrusions of the first
15 and second guide rings 382 and 384 are bent perpendicularly to a longitudinal direction and make contact with each other. A vertical end portion of the first guide ring 382 is formed therein with a substantially U-shaped groove 389,
20 and a vertical end portion of the second guide ring 384 has a hinge shaft 388 provided in a width direction of the vertical end portion. A coupling bolt 386 is vertically fixed to the hinge shaft 388 to be integrated with the hinge shaft 388.

Accordingly, the coupling bolt 386, which is configured rotatably about the hinge shaft 388, is fitted into the groove 389, the coupling nut 387 is coupled to the coupling bolt 386 protruding forward of the vertical end portion of the first guide ring 382 and fastened to make close contact with the vertical end portion of the first guide ring 382. In this case, the gripper car guide ring 380 is securely mounted on the outer circumference of the wire 150.

Meanwhile, inclined surfaces are formed on portions of inner circumferential surfaces of the first and second guide rings 382 and 384 in width directions of the first and second guide rings 382 and 384. As schematically shown in FIG. 20, the inclined surfaces downwardly protrude in the forward direction of the wire 150 and coupling parts 385 to be described later are inclined corresponding to the inclined surfaces, so that the inclined surfaces are engaged with each other to prevent the wire 150 from being moved, and to allow the wire 150 to be moved in an opposition direction to the forward direction of the wire 150.

In other words, the first and second guide rings 382 and 384 are provided therein with first and second gripper cars 311 and 312 having the one-way bearing 335 including a roller 354 making contact with an outer circumferential surface of the wire 150. The first and second gripper cars

311 and 312 are provided at a predetermined interval radially of the wire 150, and have a substantially H shape. One-way bearings 335 are installed at both parallel sides of the first and second gripper cars 311 and 312. The
5 coupling part 385, which couples the both parallel sides to each other, is fitted into the inclined surface.

In this case, the shape of the coupling part 385 is inclined corresponding to the inclined surface as shown in FIG. 20. In addition, the roller 354 is mounted on a
10 longitudinally intermediate portion of the one-way bearing 335, and makes rolling-contact with the outer circumferential surface of the wire 150. In particular, the one-way bearings 335 are mounted at both ends of the first and second gripper cars 311 and 312, and one pairs of one-
15 way bearings are more preferably grouped into one group.

As described above, according to the present invention, the gripper car guide ring 380 and the first and second gripper cars 311 and 312 are engaged together in a wedge shape so that the wire 150 is wedged in the direction of
20 towing the wire 150. Accordingly, even if there is an error in an outer diameter of the wire 150, the wire 150 is towed in the state that the the wire 150 is tightly wedged, so that the loss of the towing force is not caused, and the gripping force is significantly improved. On the contrary,
25 when the wire 150 is moved in the opposite direction to the

direction of towing the wire 150, the wedge structure is released, so that the wire 150 may be moved backward. Accordingly, use convenience, working efficiency, and an automatic adjusting function to the outer diameter of the wire can be significantly improved.

The wire gripper according to the present invention is configured to allow the coupling parts 385 of the first and second gripper cars 311 and 312 to slide down while following the wire 150 in the moving direction of the wire 150 even if the outer diameter of the wire 150 is varied depending on the length of the wire 150 due to the error of the outer diameter in the manufacturing of the wire 150. Accordingly, the coupling parts 385 are moved along the inclined surfaces of the first and second guide rings 382 and 384 to be engaged in a wedge shape. Accordingly, the gripping force is significantly increased, so that the wire 150 may be towed without loss.

However, different from the related art, the gripping force may not be reduced, or the towing failure may not be caused due to the tight engagement resulting from the large outer diameter. This is because a movement along the inclined surface is slight when the outer diameter of the wire is increased, so that adjustment is automatically made suitably for the outer diameter of the wire 150.

As shown in FIGS. 21 to 24, the gripper device according to the present invention includes a housing 212 serving as a kind of a fixing plate, a guide rail 230 protruding from the top surface of the housing 212 in a longitudinal direction, an operating plate 232 sliding along the guide rail 230, a movable body 210 fixed to a front end of the housing 212 to linearly reciprocate with a predetermined stroke, and a coupling bracket 234 to transfer the moving force of the movable body 210 to the operating plate 232 to guide the operating plate 232 such that the operating plate 232 linearly reciprocates within the stroke range of the movable body 210.

In this case, the guide rail 230 preferably has the shape of a wedge downwardly inclined and having a lower portion narrower than an upper portion thereof to prevent the operating plate 232 from being easily separated.

In addition, a driving rod 233 is provided in the movable body 210 to reciprocate within a predetermined stroke according to power variation. A coupling bracket 234 is fixed to an end portion of the driving rod 233, and one side of the operating plate 232 is fixed to another portion of the coupling bracket 234.

Meanwhile, a gripping unit 300 is fixed onto a top surface of a front end of the operating plate 232 to grip and move the wire 150. The gripping unit 300 grips and

moves the wire 150 within the stroke range only when the operating plate 232 is moved forward, and release the gripping of the wire 150 when the operating plate 232 is moved backward, so that the moved wire 150 is not moved backward. Accordingly, the wire laying work can be easily performed even in a significantly narrow space.

To this end, the gripping unit 300 includes a base 211 fixed to a top surface of a front end of an operating plate 232, support blocks 361 protruding from both sides of a top surface of the base 211, each support block having a top surface, which is recessed in an arc shape, and provided at one side thereof with a ring bracket 362, a stopper 225 protruding from the arc-shaped recessed portion of the support block 361, an arc-shaped grip link 363 having a pair of rotation rings 364 rotationally mounted in the arc-shaped recessed portion of the support block 361, an elongated stopper groove 365 formed in the rotation ring 364 such that the stopper 225 is detachably inserted into the elongated stopper groove 365, and a link fixing pin 366 passing through the ring bracket 362 and the rotation ring 364 to serve as a rotation shaft and provided at one end thereof with a holder 367 into which a portion of the grip link 363 is fitted.

Accordingly, in the state that the rotation ring 364 is mounted in the arc-shaped recessed portion of the support

block 361, the rotation ring 364 is maintained rotatably about the link fixing pin 366. When the grip link 363 is vertically erected, that is, when the grip link 363 is rotated clockwise, the elongated stopper groove 365 is maintained vertically while locking the stopper 225 into the front end of the stopper groove 365 so that the stopper 225 performs a stopping function. When the grip link 363 is rotated counterclockwise, the stopper groove 365 has a slightly elongated hole shape, so the grip link 363 has a gap from the rear end of the stopper groove 365. Accordingly, the grip link 363 is guided to smoothly rotate without stopping or locking.

Accordingly, when the actuator is moved forward, the operating plate 232 is moved forward. In this case, since the wire 150 is fitted into the grip link 363, and the lower end of the wire 150 makes linear-contact with the link fixing pin 366, the link fixing pin 366 is rotated counterclockwise due to mutual friction.

Accordingly, since the holder 367 of the link fixing pin 366 is engaged with the grip link 363, the grip link 363 is rotated counterclockwise while being inclined backward to be engaged with the wire 150. In this state, the wire 150 is moved forward, so that the wire 150 is pulled. Accordingly, the wire 150 is moved forward by a stroke.

On the contrary, when the actuator is moved backward in order to return to the original position thereof, the link fixing pin 366 is simultaneously rotated clockwise. Accordingly, the held grip link 363 is rotated clockwise while being vertically erected. Simultaneously, the stopper 225 on the support block 361 is fitted into the elongated stopper groove 365 of the rotation ring 364 to be locked to the front end of the stopper groove so that the rotation is not made any more.

Accordingly, the link fixing pin 366 is slipped in the line contact with the lower end of the wire 150 while being returned to a groove position of the actuator. In this case, since the grip link 363 is maintained in an erecting state, that is, a non-interference state with the wire 150 while being returned without change, the wire 150 remains moved and only the grip link 363 is moved backward. Thereafter, if the actuator is moved forward again, the above procedures are repeated to pull the wire 150. On the contrary, after the actuator is returned, the wire is pulled.

When the above procedures are repeatedly performed several times, the wire 150 may be smoothly moved, so that the wire 150 can be easily laid.

Although the exemplary embodiments of the present invention have been described, it is understood that the

present invention should not be limited to these exemplary embodiments but various changes and modifications can be made by one ordinary skilled in the art within the spirit and scope of the present invention as hereinafter claimed.

5 **【Industrial Applicability】**

The present invention is applicable for the use of laying a wire along a preset path by pulling the wire in a cable tray of a ship.

【CLAIMS】

【Claim 1】

A gripper device for laying a wire, the gripper device comprising:
a base;
a movable body that moves together with the wire only in first-direction movement when performing reciprocating movement in a forward-backward direction;
a gripping unit that couples an upper member and a lower member to the base by a link structure, and has timing belts provided on the lower and upper member; and
an actuator that operates the movable body to make reciprocating movement of the gripping unit.

【Claim 2】

The gripper device of claim 1, wherein a wire makes contact with three points of two timing belt of the lower member of the gripping unit and one timing belt of the upper member.

【Claim 3】

The gripper device of claim 1, wherein the timing belts of the gripping unit are provided therein with one-way bearings to restrict one direction rotation.

【Claim 4】

The gripper device of claim 1, wherein the upper member of the gripping unit is coupled to the lower member by interposing a locking rod and a knob between the upper member and the lower member such that opening force, closing force, and fastening force are varied.

【Claim 5】

A gripper device for laying a wire, the gripper device comprising:
a movable body that moves together with the wire only in first-direction movement when performing reciprocating movement in a forward-backward direction;

a driving unit that performs reciprocating movement in a forward-backward direction of the wire such that the movable body performs reciprocating movement;

a fixing ring having a longitudinally cutting portion to surround and fix an outer circumferential surface of the wire to be laid;

at least one gripper that is fitted into the fixing ring and mounted in the movable body;

a roller fixed to the gripper rotatably about a roll shaft to make contact with the outer circumferential surface of the wire; and

a one-way bearing that is mounted on the gripper to fix the roll shaft such that the roll shaft is rotated only in one direction and prevented from being rotated in an opposite direction.

【Claim 6】

The gripper device of claim 5, further comprising a coupling member installed at a cutting end portion of the fixing ring to perform a locking operation and a releasing operation in a hooking manner such that a radius of the fixing ring is varied.

【Claim 7】

The gripper device of claim 5, wherein the gripper has an H shape, and two roll shafts and two rollers are provided with respect to one gripper, and provided symmetrically to each other.

【Claim 8】

A gripper device for laying a wire, comprising:

a movable body that supports a lower portion of an outer circumferential surface of the wire and moves together with the wire only in first-direction movement when performing reciprocating movement in a forward-backward direction;

a driving unit that performs reciprocating movement in a forward-backward direction of the wire such that the movable body performs reciprocating movement;

first and second guide rings that are rotatably hinged to both ends of the movable body, mutually coupled to each other to surround the wire, and having inclined surfaces formed at portions of inner circumferential surfaces thereof, respectively, and inclined downward such that radiuses of the first and second guide rings are gradually reduced in a movement direction of the wire;

first and second gripper cars having inclined surfaces corresponding to the inclined surfaces and fitting-assembled to form a wedge-shaped assembly structure;

one-way bearings mounted on the movable body and the first and second gripper cars, respectively; and

a roller shaft-fixed to a longitudinally intermediate portion of the one-way bearing to make contact with the outer circumference surface of the wire.

【Claim 9】

The gripper device of claim 8, wherein a coupling bolt and a coupling nut are provided at mutually facing end portions of the first and second guide rings such that the coupling bolt and the coupling nut are coupled to each other.

【Claim 10】

The gripper device of claim 8, wherein a pair of one-way bearings are grouped and provided at both of front and rear end portions of the movable body and the first and second gripper cars.

【Claim 11】

A gripper device used when laying a wire, the gripper device comprising:

an actuator that performs linearly-reciprocating movement within a predetermine stroke; and

a gripping unit that is mounted on a top surface of a front end of the actuator to move the wire by the stroke while changing an engagement state with the wire in a movement direction of the actuator,

wherein the gripping unit comprises a base fixed to a top surface of a front end of an operating plate, support blocks protruding from both sides of a top surface of the base, each support block having a top surface, which is recessed in an arc shape, and provided at one side thereof with a ring bracket, a stopper protruding from the arc-shaped recessed portion of the support block, an arc-shaped grip link having a pair of rotation rings rotationally mounted in the arc-shaped recessed portion of the support block, an elongated stopper groove formed in the rotation ring such that the stopper is detachably inserted into the elongated stopper groove, and a link fixing pin passing through a ring bracket and the rotation ring to serve as a rotation shaft and provided at one end thereof with a holder into which a portion of the grip link is fitted.

【Claim 12】

The gripper device of claim 11, wherein the actuator comprises: a housing; a guide rail protruding in a longitudinal direction from a top surface of the housing; an operating plate sliding along the guide rail; a movable body fixed to a front end of the housing to linearly reciprocate with a predetermined stroke; a coupling bracket to transfer moving force of the movable body to the operating plate and to guide the operating plate such that the operating plate linearly reciprocates with a stroke range of the movable body.