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(54) **BACKWARD TENSION APPLYING MECHANISM FOR TWISTING PAIRED ELECTRIC WIRES AND METHOD FOR FABRICATING TWISTED PAIR CABLE BY EMPLOYING BACKWARD TENSION APPLYING MECHANISM**

RÜCKWÄRTSSPANNUNGSMECHANISMUS FÜR VERDRILLTE GEPAAARTE ELEKTRODRÄHTE
UND VERFAHREN ZUR HERSTELLUNG EINES VERDRILLTEN KABELPAARES MITTELS
ANWENDUNG DES RÜCKWÄRTSSPANNUNGSMECHANISMUS

MÉCANISME D'APPLICATION DE TENSION ARRIÈRE POUR TORSADER DES FILS
ÉLECTRIQUES APPARIÉS ET PROCÉDÉ DE FABRICATION DE CÂBLE À PAIRE TORSADÉE
UTILISANT CE MÉCANISME D'APPLICATION DE TENSION ARRIÈRE

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Description

Technical Field

[0001] The present invention relates to a backward tension applying mechanism for twisting paired electric wires at equal pitches without any slack to make a twisted pair cable that is excel in signal protection against electrical noise, and a method for fabricating a twisted pair cable by employing the same mechanism.

Background Art

[0002] Conventionally, there have been proposed various fabrication configurations for fabricating the twisted and paired electric wires (twisted pair cable) by twisting together paired electric wires. For example, PTL1 describes a twisted pair cable fabrication configuration in which connectors connected to ends of paired electric wires are fixed to corresponding receiving jigs, the paired electric wires are respectively inserted into electric wire insertion grooves in a central driven gear, and the driven gear is rotated by a drive gear to twist together the paired electric wires.

[0003] In addition, PTL2 describes, as a conventional example, a twisted pair cable fabrication configuration in which terminals at one ends of paired electric wires are fixed to a stationary member, while terminals at the other ends are fixed to a rotary member, and the paired electric wires are twisted together by rotating the rotary member. As one embodiment, a configuration is described in which paired electric wires are fed out towards the other end side of the paired electric wires while one end portion of each of the paired electric wires are twisted respectively within cylindrical portions, and a rotor at an intermediate portion is fed out towards the other end side while being rotated in the same direction as the direction of the twisting at the one end portions so as to twist together the paired electric wires.

[0004] Additionally, PTL3 describes a twisted pair cable fabrication configuration in which one ends of paired electric wires are respectively fixed to corresponding clamps at the one end, the other ends of the paired electric wires are respectively connected to corresponding clamps at the other end, the clamps at the other end are respectively pulled by corresponding cylinders, and the clamps at both the ends are respectively rotated in opposite directions by corresponding motors so as to form a twisted pair cable.

[0005] In addition, PTL4 describes a twisted pair cable fabrication configuration which employs pairs of electric wires which are different in length. One ends of the pairs of the electric wires are fixed to a common clamp, while the other ends of the long electric wire and short electric wire are respectively connected to corresponding clamps. The clamp for the short electric wire can move forwards and backwards. Then, the clamps connected to the other ends are rotated by motors to form the pairs

of electric wires which are different in length.

Citation List

5 Patent Literature

[0006]

[PTL 1] JP-A-2000-149684 (Fig. 1)
 [PTL 2] JP-A-2007-227185 (Figs. 1 and 4)
 [PTL 3] JP-A-2005-149966 (Fig. 4)
 [PTL 4] JP-A-2004-362881 (Fig. 11)

Summary of Invention

Technical Problem

[0007] However, in the prior arts that are described in PTL1 to PTL4, in a case in which paired electric wires are twisted together as is shown in an example in Figs. 7(a) and (b), there would be caused the following possibility. In Fig. 7(a), one ends of paired electric wires 61 are connected together to a common clamp 62, while the other ends of the paired electric wires 61 are connected to corresponding clamps 63. Then, the paired electric wires 61 are twisted together by rotating an intermediate rotor 64, for example, in such a state that a backward tension (a tensile force) is applied to the paired electric wires 61 on the common clamp 62 side. As this occurs, since there exists variation within a permitted tolerance in length to which the paired electric wires 61 were cut, the paired electric wires 61 are twisted together with the longer electric wire 61₁ being slackened slightly, and the variation in length of the paired electric wires 61 is absorbed in a twisted portion as is shown in Fig. 7(b). This deteriorates the accuracy of pitch at which the electric wires 61 are twisted, and therefore, it has been unable to ascertain that twisted portions 61a are uniform in condition irrespective of their positions along the length of a completed twisted pair cable 61'. Because of this, the quality of the completed twisted pair cable 61' needs to be guaranteed by measuring an inter-wire gap and characteristic impedance. In Fig. 7(b), reference numeral 65 denotes a terminal connected to both the ends of the paired electric wires 61.

Solution to Problem

[0008] The present invention has been made in view of the situations that are described above, and it is an object of this invention to provide a backward tension applying mechanism for twisting paired electric wires, which can form a twisted pair cable with good quality which is twisted at uniform pitches without involving any slack by devising the way to apply backward tension, even in a case in which there exists variation in length of paired electric wires and a method for fabricating the twisted pair cable by employing the same mechanism.

[0009] In order to achieve the object, according to a first aspect of the present invention, there is provided a backward tension applying mechanism for twisting paired electric wires, according to claim 1.

[0010] According to the configuration, one ends of paired electric wires are connected to the pair of electric wire clamps, while the other ends of the paired electric wires are fixed to other electric wire clamps. Then, the pair of air cylinders are actuated, and the pair of electric wire clamps are caused to move backwards respectively relative to the common stationary base plate by the pair of movable base plate, whereby the paired electric wires are pulled respectively relative to the other electric wire clamps so as to absorb slack therein. Then, in this state, the paired electric wires are twisted together at equal pitches without involving any slack (looseness).

[0011] According to a second aspect of the present invention, there is provided a method for fabricating a twisted pair cable, according to claim 2.

[0012] According to the configuration, the one end portions of the paired electric wires are fixed by the pair of electric wire clamps, and the other end portions of the paired electric wires are fixed by the other electric wire clamps. Then, the pair of air cylinders are actuated so that the pair of electric wire clamps caused to move backwards respectively relative the common stationary base plate by the pair of movable base plates so as to absorb slack in each of the paired electric wires. Then, in this state, the paired electric wires are twisted together at equal pitches without involving any slack (looseness). The twisting of the paired electric wires is implemented, for example, by rotating the other electric wire clamps by a motor, by turning the paired electric wires by a rotor between the pair of electric wire clamps and the other electric wire clamps, or by rotating the other electric wire clamps by the motor, while rotating the rotor, in the same direction and rotation speed as the rotor. The other electric wire clamps may be paired up with each other or a common electric wire clamp may be adopted to fix the other end portions of the paired electric wires.

Advantageous Effects of Invention

[0013] According to the first aspect of the present invention, even though the paired electric wires have different lengths, the paired electric wires can be twisted together in such a state that the paired electric wires are stretched tight by absorbing slack therein by pulling respectively the paired electric wires by the corresponding air cylinders. By adopting this configuration, even in a case in which there exists variation in length of paired electric wires, it is possible to form a twisted pair cable with good quality in which the paired electric wires are twisted together at uniform pitches without involving any slack.

[0014] According to the second aspect of the present invention, even though the paired electric wires have different lengths, the paired electric wires can be twisted

together in such a state that the paired electric wires are stretched tight by absorbing slack therein by pulling respectively the paired electric wires by the corresponding air cylinders. By adopting this configuration, even in a case in which there exists variation in length of paired electric wires, it is possible to form a twisted pair cable with good quality in which the paired electric wires are twisted together at uniform pitches without involving any slack.

Brief Description of the Drawings

[0015]

Fig. 1 is a perspective view showing an embodiment of a backward tension applying mechanism according to the present invention.

Fig. 2 is a perspective view showing electric wire clamps of the backward tension applying mechanism.

Fig. 3 is a perspective view showing a state in which backward tension is applied to electric wires in the backward tension applying mechanism.

Fig. 4 is a perspective view showing one mode of other electric wire clamps which are disposed at an opposite side to the side where the backward tension applying mechanism is disposed.

Fig. 5(a) is a schematic plan view showing one mode of a method for fabricating a twisted pair cable, and Fig. 5(b) is a schematic plan view showing a completed twisted pair cable.

Fig. 6 is a perspective view showing one mode of a twisted pair cable-fabrication-apparatus to which the backward tension applying mechanism is applied.

Fig. 7(a) is a schematic plan view showing one mode of a conventional method for fabricating the twisted pair cable, and Fig. 7(b) is a schematic plan view showing the completed twisted pair cable.

40 Description of Embodiments

[0016] Figs. 1 to 3 show one embodiment of a backward tension applying mechanism for twisting paired electric wires according to the present invention.

[0017] As shown in Fig. 1, a backward tension applying mechanism 1 for twisting paired electric wires includes a pair of left and right electric wire clamps 2, a pair of left and right strip-like movable base plates 3 on which the electric wire clamps 2 are installed respectively, a rectangular common stationary base plate 5 having a pair of left and right guide rails 4 with which the movable base plates 3 are respectively brought into slidable engagement, and a pair of left and right long air cylinders 6 which are provided at left- and right-hand sides of the common stationary base plate 5 and of which distal ends of rods 6a are fixed to front ends of the corresponding movable base plates 3 via corresponding brackets 7.

[0018] The clamps 2, movable base plates 3, rails 4,

air cylinders 6 and brackets 7 are each disposed symmetrically widthwise. Each of the clamps 2 has a horizontal electric wire insertion groove 9 having a terminating end face (a rear end face) 9a which is disposed symmetrically widthwise with a terminating end face (a rear end face) 9a of a horizontal electric wire insertion groove 9 in the other clamp 2 and with which a distal end 8a of each of a pair of left and right electric wires 8 is brought into abutment, a block portion 10 in an upper surface of which the electric wire insertion groove 9 is provided, a cutout portion 10c provided in an external vertical side-wall 10b of the block portion 10 at a front portion of the electric wire insertion groove 9, a vertically elongated movable electric wire holding plate 11 which enters the cutout portion 10c so as to fixedly hold a distal end portion of the electric wire 8 between an inner surface of a vertical inner wall 10d of the block portion 10 and itself, a compression coil spring (a spring member) 12 which biases the electric wire holding plate 11 towards the internal wall 10d of the block portion 10, an operation lever 13 which can move forwards and backwards and which is formed into an L-shape at a rear end thereof, and wedge-shaped portions 14 (refer to Fig. 2) which are formed integrally on a front portion of the operation lever 13 to press the electric wire holding plate 11 outwards against the biasing force of the coil spring 12 so as to form a gap which is equal to or larger than a diameter of the electric wire between the electric wire holding plate 11 and the internal wall 10d of the block portion 10.

[0019] The movable base plates 3 are disposed so as to lie close widthwise to each other, and the clamps 2 are disposed so as to lie close widthwise to each other. The movable base plates 3 and the clamps 2 are both separated widthwise from each other with respect to a central narrow gap 15 as a boundary. The clamp 2 is disposed on a front half of the corresponding movable base plate 3, and one of a pair of left and right short air cylinders 16 is disposed on a rear half of the movable base plate 3 concerned. The pair of air cylinders 16 are designed to automatically release the fixing of the electric wires by the clamps 2. In a state shown in Fig. 1 in which the electric wires are fixed (set) in place, distal ends of rods 16a of the short air cylinders 16 are in abutment with rear end faces 13a of the operation levers 13 which has retreated. The air cylinders 16 are disposed so as to lie close widthwise to each other and are separated widthwise from each other with respect to a central gap 17 as a boundary.

[0020] The common stationary base plate 5 is formed wider than a total width of the pair of left and right movable base plates 3, and the pair of left and right guide rails 4 are disposed so as to extend from a rear end 5a to a position lying further forwards than a front end 5b of the common stationary base plate 5 by passing the front end 5b (with front end portions of the guide rails 4 so extending denoted by reference numeral 4a). In addition, sliding engagement portions 18 are provided on respective rear surfaces of the movable base plates 3 so as to be brought

into slidable engagement with the corresponding guide rails 4. A stopper plate 20 is erected at the rear end 5a of the common stationary base plate 5, and this stopper plate 20 has a pair of left and right stopper projections 20 with which stopper projections 19 at rear ends of the movable base plates 3 are brought into abutment.

[0021] Cylinder main bodies 6b, having a hollow cylindrical shape, of the pair of left and right backward tension applying air cylinders 6 are fixedly disposed at left- and right-hand sides of a front surface of the common stationary base plate 5 in positions which lie further outwards widthwise than the pair of movable base plates 3 so as to extend longitudinally from the rear end to the front end of the common stationary base plate 5. The respective rods 6a of the air cylinders 6 project long towards the front and are then connected respectively to brackets 7 which project widthwise at respective front ends of the movable base plates 3. In a state shown in Fig. 1 in which the rods 6a of the air cylinders 6 are extended, no backward tension is applied to the electric wires 8, and therefore, the electric wires 8 hang down loosely. The clamps 2 are closed to hold the electric wires 8 side by side widthwise at the same height.

[0022] Fig. 2 shows a state in which the clamps 2 are each opened. In the state shown in Fig. 2, when the operator inserts one end portions of the electric wires 8 (See, Fig. 1) into the electric wire insertion grooves 9 in the clamps 2 and pulls the operation levers 13 backwards, the tapered wedge-shaped portions 14 retreat together with the operation levers 13, whereby the gaps between the inner walls 10d and the holding plates 11 in the block portions 10 are narrowed down to a gap equal to or smaller than the diameter of the electric wire, and the electric wires 8 are fixedly held between the inner walls 10d and the holding plates 11 by virtue of the biasing forces of the coil springs 12.

[0023] The respective rods 6a of the air cylinders 6 are retracted into the corresponding cylinder main bodies 6b by virtue of respective air pressures of the air cylinders 6 as is shown in Fig. 3 from the state shown in Fig. 1, whereby the movable base plates 3 move backwards along the corresponding guide rails 4 together with the corresponding rods 6a. Then, the clamps 2 move backwards together with the corresponding movable base plates 3, whereby backward tension is applied respectively to the electric wires 8 by the corresponding clamps 2.

[0024] Even though lengths of the electric wires 8 vary, by applying the backward tension respectively to the electric wires 8 in the way described above, tensile forces applied to the electric wires 8 are made uniform (that is, the electric wires 8 are pulled with equal forces), whereby the generation of slack due to the difference in length between the electric wires 8 is prevented. Respective plugs 6c of the air cylinders 6 may be connected to a common air pressure hose. In Fig. 3, the respective rods 6a of the air cylinders 6 are not compressed completely but still project leaving an extra stroke to some extent,

so that backward tension can be applied to an electric wire 8 which is longer than expected.

[0025] Fig. 3 shows a state in which the electric wires 8 are set at one ends thereof. The other ends of the electric wires 8 are fixed separately by a pair of left and right cylindrical electric wire clamps (other electric wire clamps) 21, for example, as is shown in an example in Fig. 4. The clamps 2 shown in Fig. 4 each include a cylindrical wall 22, an electric wire insertion groove 23 provided in the cylindrical wall 22 and having an electric wire abutment surface 23a at a terminating end, a holding portion 24 which holds an end portion of the electric wire 8 inserted in the electric wire insertion groove by virtue of a biasing force of a spring, and an L-shaped operation lever 25 which lies at right angles to the cylindrical wall and which opens the holding portion 24 against the biasing force of the spring. The clamps 2 are fixed to a common rotary plate 26 while lying side by side widthwise, and the rotary plate 26 is connected, in turn, to a motor 27, whereby the clamps 2 and the rotary plate 26 rotate together by driving the motor 27. The motor 27 is fixed to a base plate 28 via short strut 29.

[0026] One mode of a method for fabricating a twisted pair cable by employing the backward tension applying mechanism described above is shown in Fig. 5(a). As shown Fig. 5(a), front and rear ends of a long electric wire 8₁ and a short electric wire 8₂, which are eventually cut to different lengths which fall within a permitted cutting tolerance, are fixed in place respectively by the front and rear clamps 2, 21. The front (or other) clamps 21 are disposed side by side widthwise without being offset in a front-to-rear direction, whereby the front end positions of the electric wires 8 are regulated equally by the clamps 21. The rear clamps 2 are caused to move slidably backwards by the corresponding air cylinders 6 (See Fig. 3), and the rear clamp 2 holding the long electric wire 8₁ and the rear clamp 2 holding the short electric wire 8₂ are positioned so as to be spaced apart in the front-to-rear direction from each other, with the former rear clamp 2 positioned rearwards and the latter rear clamp 2 positioned forwards, whereby backward tension is applied respectively to the electric wires 8 which are so fixed to the corresponding rear clamps 2.

[0027] In this state, for example, a rotor 30, which is disposed close to the clamps 2 at the rear ends of the electric wires 8, is caused to move towards the front clamps 21 at a constant speed while rotating in one direction as is indicated by an arrow. At the same time, the front clamps 21 are rotated by the motor 27 (See Fig. 4) in the same direction and at the same speed as the rotor 31. Thus, the paired electric wires 8 are twisted together between the rear clamps 2 and the rotor 30.

[0028] While twisting the paired electric wires 8, as is shown in Fig. 5(b), the permitted cutting tolerance between the paired electric wires 8 is absorbed at a non-twisted portion 8c on the side where the backward tension is loaded to the electric wires 8 (the side of the rear end portions of the electric wires 8). Then, since the long elec-

tric wire 8₁ has an extra longer length L than the short electric wire 8₂ at the end portion, pitches P between twisted portions 8d of the paired electric wires 8 are made uniform, and therefore, there is completed a twisted pair cable which is twisted at uniform pitches P and in a neat fashion at every twisted portion 8d.

[0029] Thus, since the performance of a product (a twisted pair cable 8') can be guaranteed only by measuring pitches P by the operator, the conventionally performed measurement of inter-wire gap and characteristic impedance is made unnecessary. In Fig. 5(b), reference numeral 31 denotes a terminal which is electrically connected to the front and rear ends of the electric wires 8 through press contact.

[0030] In Fig. 3, although the lengths of the electric wires 8 are reduced while the paired electric wires 8 are being twisted, the value (N) of backward tension being applied can be controlled by the air pressures of the backward tension applying air cylinders 6 by regulating (controlling) the air pressures of the air cylinders 6 by an air regulator. The rods 6a of the air cylinders 6 do not extend, and the value of backward tension is regulated by the air pressures. Air pressures are applied to the air cylinders 6 so as to realize a value of backward tension which is predetermined depending upon the diameter or type of electric wires used, and the regulation is completed when a prescribed air pressure is reached.

[0031] After the paired electric wires 8 are twisted as desired, the rods 6a of the air cylinders 6 are extended longest as is shown in Fig. 1, and the holding of the electric wires by the clamps 2 is released as is shown in Fig. 2, whereby the twisted pair cable 8' can be removed from the clamps 2. The clamps 2 can automatically be released by extending the short air cylinders 16 shown in Fig. 1 so as to move the operation levers 13 to the front.

[0032] Fig. 6 shows an example of a twisted pair cable fabrication apparatus 32 to which the backward tension applying mechanism described above is applied.

[0033] The backward tension applying mechanism 1 is provided equally on each of three circumferential surfaces of one (rear) intermittent rotary member 33 which are provided circumferentially at equal intervals. In Fig. 6, reference numeral 2 denotes an electric wire clamp, reference numeral 16 denotes a clamp releasing cylinder, reference numeral 6 denotes a backward tension applying cylinder, reference numeral 3 denotes a movable base plate, and reference numeral 5 denotes a common stationary base plate. The three circumferential surfaces are made up of three common stationary base plates 5.

[0034] A pair of electric wire clamps (other electric wire clamps) 21 and a common motor 27, which are like those shown in Fig. 4, are provided equally on three circumferential surfaces of the other (front) intermittent rotary member 34 which are disposed circumferentially at equal intervals. The three circumferential surfaces are made up of three base plates 28 which are like that shown in Fig. 4. The intermittent rotary members 33, 34 are sup-

ported rotatably on corresponding struts 35, 36 and are rotated together through one thirds the full rotation at a time by an intermittent driving device (for example, an air cylinder 37 and a torque brake 38). In each of the intermittent rotary members 33, 34, the circumferential surface situated on a near side refers to an electric wires setting plane 5, 28, the circumferential surface situated to face downwards refers to a paired electric wires twisting plane 5₂, 28₂, and the circumferential surface situated on a far side refers to a twisted pair cable discharge plane 5₃, 28₃.

[0035] Paired electric wires 8 (See Figs. 3, 4) are fixed in place by the front and rear clamps 2, 21 on the circumferential surfaces at the electric wires setting planes 5, 28, and backward tension is applied to the paired electric wires 8 by the horizontal cylinders 6. Then, when the circumferential surface rotates to the paired electric wires twisting planes 5₂, 28₂, a rotor 30, which is cut to be opened in part of a circumference thereof so as to have a cutout opening portion 30a and which has a twisting rod 30b erected to face the cutout opening portion 30a as is shown in Fig. 5(a), is raised by a vertical air cylinder (not shown) so as to be set between the paired electric wires 8 (or the paired electric wires 8 are inserted through the annular rotor 30). Then, the paired electric wires 8 are twisted together by rotating the rotor 30 and the motor 27 simultaneously. Then, when the circumferential surface rotates to the twisted pair cable discharge plane 5₃, 28₃, tapes are automatically wound around both front and rear ends of a twisted pair cable 8' (See Fig. 5(b)), and a completed twisted pair cable is discharged. This cycle is automatically repeated to thereby fabricate twisted pair cables 8' with good efficiency.

[0036] While the embodiment is described as employing the rotor 30, a configuration employing no rotor 30 may be adopted in which the clamps 21 shown in Fig. 4 are rotated by the motor 27 in such a state that one ends of the paired electric wires 8 are fixed in place by the clamps 2 shown in Fig. 3, while the other ends of the paired electric wires 8 are fixed in place by the clamps 21 shown in Fig. 4, whereby the paired electric wires 8 can be twisted between the clamps 2 and the clamps 21. The clamps 21 shown in Fig. 4 refer to an example of holding the paired electric wires 8, and therefore, any shapes or configurations can be set as required, provided that they can fixedly hold the paired electric wires 8' respectively and can be rotated by the motor 27.

[0037] In addition, the clamp assembly made up of the clamps 2, the cylinders 6, 16 and the base plates 3, 5, which are shown in Fig. 3, that is, the backward tension applying mechanism 1 can be rotated by a motor (not shown). In this case, the clamps 21 shown in Fig. 4 can be made into a common clamp which clamps the electric wires 8 altogether. In addition, the paired electric wires 8 can be twisted together between the front and rear clamps 2, 21 by rotating the intermediate rotor 30 only without using the motor 27 on the clamp side. Additionally, the clamps 3 shown in Fig. 3 refer to an example of

holding the paired electric wires 8, and therefore, any shapes or configurations can be set as required, provided that they can fixedly hold the paired electric wires 8 respectively.

[0038] In addition, in Fig. 1, the cylinder main bodies 6b of the backward tension applying air cylinders 6 can be connected to front ends of the movable base plates 3, and the rods 6a of the air cylinders 6 can be connected to rear ends of the common stationary base plate 5. In short, the air cylinders 6 may only have to connect the movable base plates 3 with the common stationary base plate 5.

Industrial Applicability

[0039] The backward tension applying mechanism and the twisted pair cable fabrication method which employs the same mechanism can be applied to increase the performance of a twisted pair cable which is applied to a noise prevention signal wire etc. for motor vehicles by forming twisted portions at equal intervals without involving any slack (looseness) therein.

[0040] This application is based upon and claims the benefit of priority of Japanese Patent Application No. 2010-166699 filed on July 26, 2010.

Reference Sign List

[0041]

- 1 backward tension applying mechanism
- 2 electric wire clamp
- 3 movable base plate
- 4 guide rail
- 5 common stationary base plate
- 6 air cylinder
- 8 electric wire
- 21 other electric wire clamp

Claims

1. A backward tension applying mechanism (1) for twisting paired electric wires, comprising:
 - a pair of electric wire clamps (2) and a pair of air cylinders (16) which are designed to automatically release the fixing of the electric wires by the clamps;
 - a pair of movable base plates (3) to which the pair of electric wire clamps are respectively

fixed;

a common stationary base plate (5) with which the pair of movable base plates are brought into engagement so as to be slidable independently from each other in a longitudinal direction of the electric wires along guide rails (4); and another pair of air cylinders (6) which apply backward tension to connect the common stationary base plate with the pair of movable base plates.

2. A method for fabricating a twisted pair cable by employing the backward tension applying mechanism defined in claim 1, comprising the steps of:

fixing one end portions of paired electric wires by the pair of electric wire clamps, and fixing the other end portions of the paired electric wires by other electric wire clamps;

actuating the other pair of air cylinders so as to cause the pair of electric wire clamps to move backwards independently from each other respectively relative to the common stationary base plate by the pair of movable base plates and pull the paired electric wires respectively relative to the other electric wire clamps; and twisting the paired electric wires together in that state; and

automatic release of the electric wires fixed by the electric wire clamps.

Patentansprüche

1. Mechanismus (1) zum Ausüben von rückwärts gerichtetem Zug, mit dem paarige elektrische Drähte verdreht werden, wobei er umfasst:

ein Paar Klemmen (2) für elektrische Drähte und ein Paar Druckluftzylinder (16), die so eingerichtet sind, dass sie die Fixierung der elektrischen Drähte mit den Klemmen automatisch lösen;

ein Paar beweglicher Trägerplatten (3), an denen die paarigen Klemmen für elektrische Drähte jeweils befestigt sind;

eine gemeinsame stationäre Trägerplatte (5), mit der die paarigen beweglichen Trägerplatten so in Eingriff gebracht werden, dass sie unabhängig voneinander in einer Längsrichtung der elektrischen Drähte an Führungsschienen (4) entlang verschoben werden können; und ein weiteres Paar Druckluftzylinder (6), die rückwärts gerichteten Zug ausüben, um die gemeinsame stationäre Trägerplatte mit den paarigen beweglichen Trägerplatten zu verbinden.

2. Verfahren zum Herstellen eines verdrehten Doppelkabels unter Einsatz des Mechanismus zum Ausü-

ben von rückwärts gerichtetem Zug nach Anspruch 1, wobei es die folgenden Schritte umfasst:

Fixieren der einen Endabschnitte paariger elektrischer Drähte mit dem Paar Klemmen für elektrische Drähte und Fixieren der anderen Endabschnitte der paarigen elektrischen Drähte mit anderen Klemmen für elektrische Drähte; Betätigen des anderen Paares von Druckluftzylindern, um zu bewirken, dass sich die paarigen Klemmen für elektrische Drähte mittels der paarigen beweglichen Trägerplatten unabhängig voneinander jeweils relativ zu der gemeinsamen stationären Trägerplatte rückwärts bewegen und die paarigen elektrischen Drähte jeweils relativ zu den anderen Klemmen für elektrische Drähte ziehen;

Verdrillen der paarigen elektrischen Drähte miteinander in diesem Zustand; und automatisches Lösen der durch die Klemmen für elektrische Drähte fixierten elektrischen Drähte.

Revendications

1. Mécanisme d'application de tension arrière (1) pour des câbles électriques à paire torsadée, comprenant :

une paire de pinces de fils électriques (2) et une paire de vérins pneumatiques (16) qui sont conçus pour relâcher automatiquement la fixation des câbles électriques par les pinces ;

une paire de plaques de base mobiles (3) auxquelles sont respectivement fixées les pinces de fils électriques ;

une plaque de base fixe commune (5) avec laquelle les plaques de la paire de plaques de base mobile sont mises en contact de façon à pouvoir coulisser indépendamment les unes des autres dans la direction longitudinale des câbles électriques le long de rails de guidage (4), et une autre paire de vérins pneumatiques (6) qui appliquent une tension arrière pour relier la plaque de base fixe commune avec la paire de plaques de base mobiles.

2. Procédé de fabrication d'un câble à perte torsadée utilisant le mécanisme d'application de tension arrière selon la revendication 1, comprenant les étapes consistant à :

fixer des parties d'extrémité de câbles électriques appariés au moyen de la paire de pinces de fils électriques , et fixer les autres parties d'extrémité des câbles électriques appariés au moyen d'autres pinces de fils électriques ;

actionner l'autre paire de vérins pneumatiques de façon à faire respectivement reculer la paire de pinces de fils électriques indépendamment les unes des autres, par rapport à la plaque de base fixe commune au moyen de la paire de plaques de base mobiles et respectivement tirer les câbles électriques appariés par rapport aux autres pinces de fils électriques ; et
torsader ensemble les câbles électriques appariés dans cet état ; et
relâcher automatiquement les câbles électriques fixés par les pinces de fils électriques.

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Fig. 1

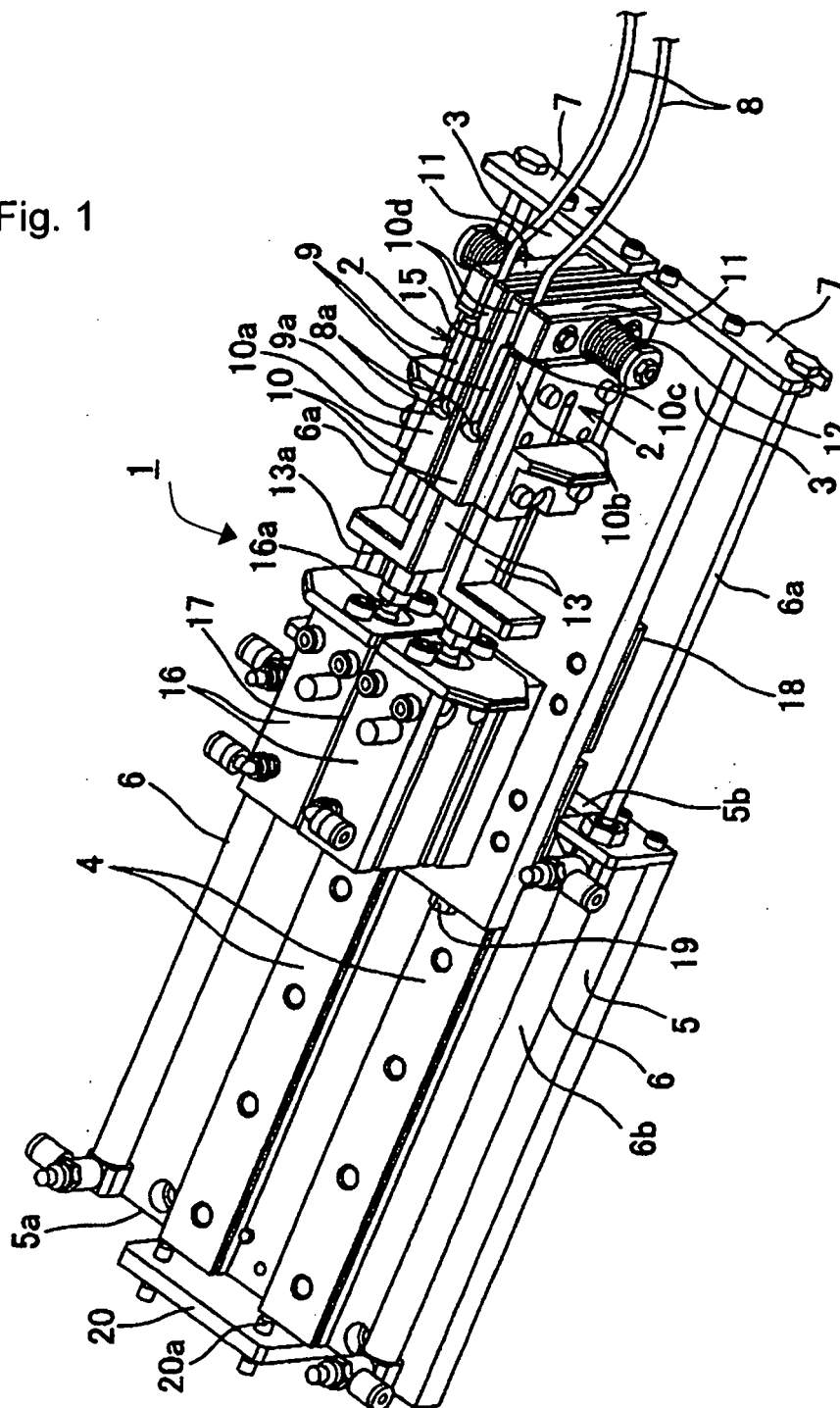


Fig. 2

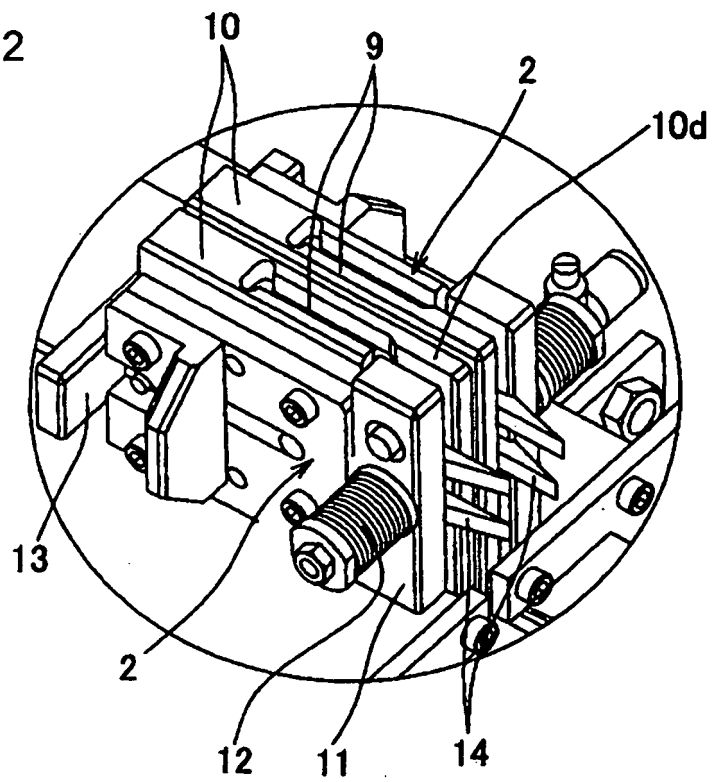


Fig. 3

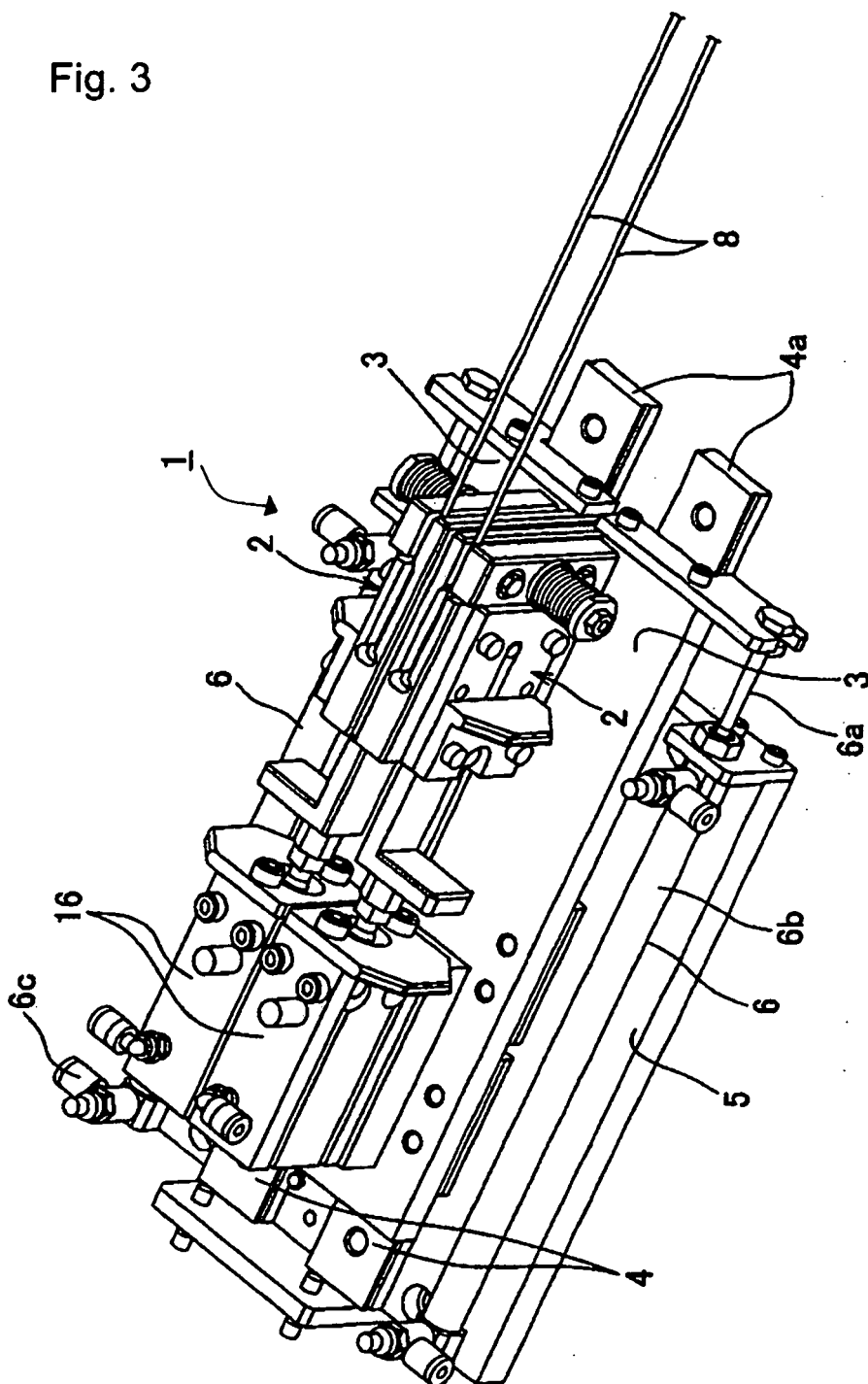


Fig. 4

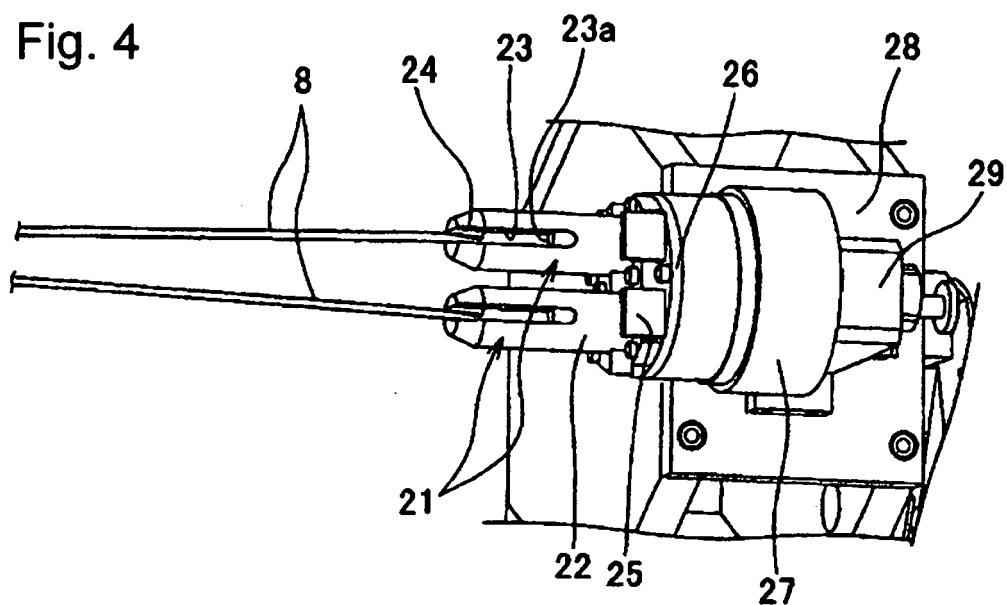


Fig. 5(a)

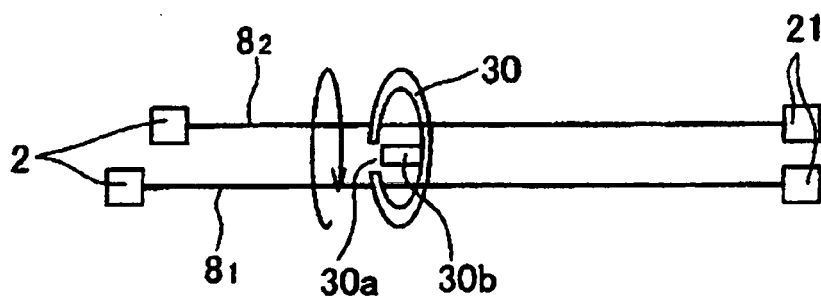


Fig. 5(b)

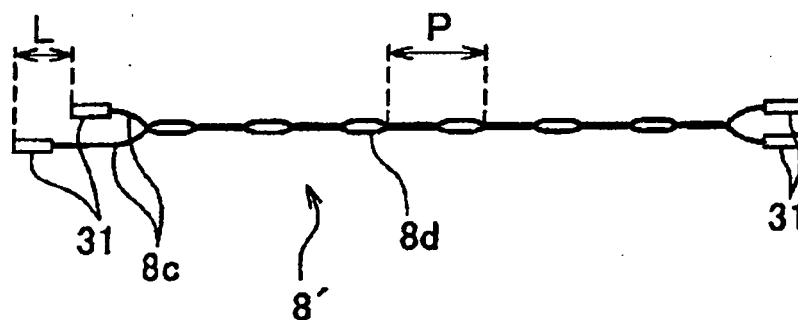


Fig. 6

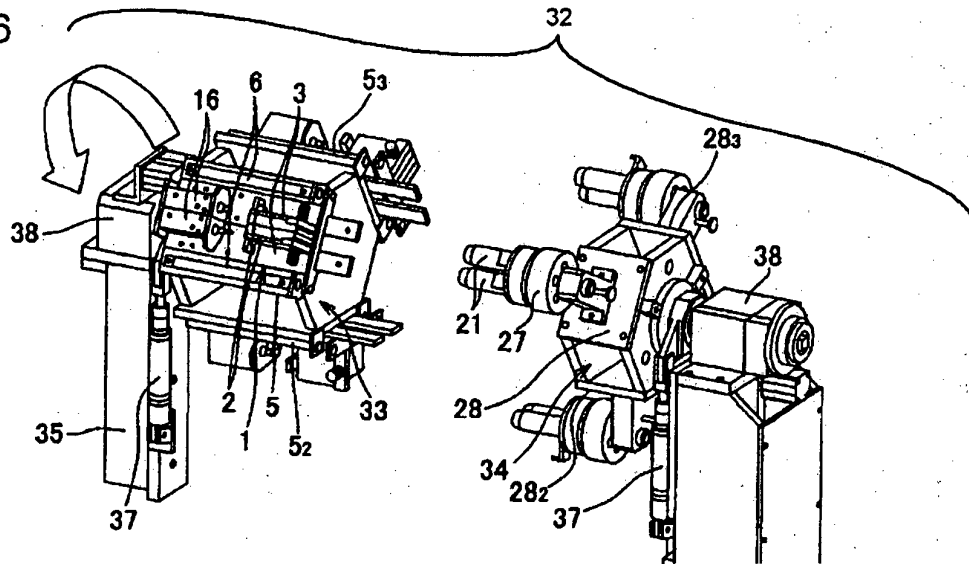


Fig. 7(a)

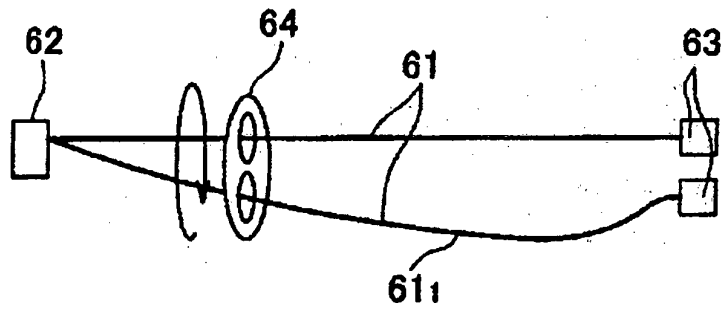
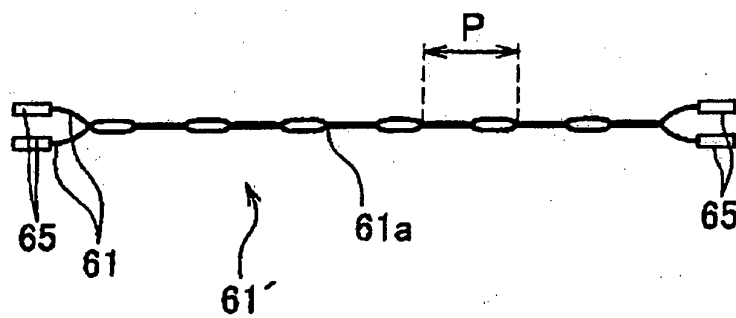


Fig. 7(b)



REFERENCES CITED IN THE DESCRIPTION

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