

TWISTING APPARATUS

The invention relates to a twisting apparatus and a method for twisting electrical or optical lines such as wires, cables, line bundles, optical fibres etc. comprising a base and a first twisting head which can be rotated relative to the base, which is
5 configured to grip the lines to be twisted at their first ends.

Twisted lines are used, for example, in vehicles, aircraft etc. in order to reduce interference influences on and from other lines as far as possible. The twisted lines must comply with specifications. They must have a defined uniform lay length over the entire length and the insulation must not be damaged. The average length of
10 twisted lines in an automobile, for example, is about 4 metres.

Twisting machines are also known from the following documents US6289944B1, EP1032095A3, DE10107670B4, EP0889486B1 and DE000019631770C2.

The lines which are initially clamped parallel to the line ends in holders are, according to the known prior art, set in rotation about the longitudinal axis by a
15 driven twisting head at one line end whereas the opposite line ends are clamped stationarily in the holder.

The disadvantage resulting from the known prior art can be seen in particular in that the actual twisting process hinders a temporal optimisation of the process. The rotational speed of the twisting head is restricted with a view to process safety and
20 protection of the lines.

It is the object of the invention to eliminate this disadvantage and provide a twisting process together with method by which means the duration of the actual twisting process can be substantially reduced. At the same time, the line should be optimally protected. The twisting process should therefore take place in a line protecting
25 manner. The line insulation and the copper strands must not be damaged. A reliable and easy to program process sequence should be ensured.

This object is achieved with a twisting head of the type mentioned initially whereby the twisting apparatus comprises a second twisting head which can be rotated relative to the base which is disposed opposite the first twisting head and which is
30 configured to grip the lines to be twisted at their second ends opposite the first ends

and the second twisting head can be rotated in the opposite direction to the first twisting head.

- By using oppositely rotating twisting heads at both line ends, the twisting time is approximately halved. In this case, the lines to be twisted are also treated in a gentle manner in the process as with twisting devices with one end-side twisting drive. The twisting heads are spaced apart from one another by approximately the length of the lines to be twisted. This spacing is preferably variable in order on the one hand to be adaptable to different cable lengths and on the other in order to exert a predetermined tensile force on the lines to be twisted during the twisting process.
- The twisting heads are in this case mounted on the base in such a manner that they substantially have this same axis as the axis of rotation. In the case of tensioned lines this axis approximately coincides with the longitudinal axes of the lines. The common base can be a frame, a table, a suspension, a socket, a mounting platform, a rail and the like.
- The lines are set in rotational movement about their longitudinal axis at both line ends by oppositely driven twisting heads and in this way twisted with one another in their entire twisting length. The line ends clamped in the twisting head are not twisted. The twisting heads preferably have their own drives.
- The acceleration of the twisting head and therefore the lines about the longitudinal axis is initially accomplished slowly so that the individual lines can form uniform loops with one another over the entire length and are stabilised in coherence. The twisting process is then further accelerated as far as the final rotational speed where the lines are held under tension with a defined tensile force in the longitudinal direction.
- The twisting is accomplished according to adjustable programs. Initially a preselectable number of revolutions is twisted in one direction, then specifically turned back in the opposite direction of rotation so that the ready twisted line has no externally acting tension. This is the case when the twisted line which is no longer clamped lies stretched out flat on a surface without curving, does not turn about its own axis or form loops.

Twisting devices according to the prior art have a twisting drive on only one line end and a non-rotating line holder at the second line end. For the same number of

revolutions the twisting process therefore lasts twice as long with one twisting head as with two oppositely driven twisting heads according to the invention (requirement: the same acceleration ramps and maximum rotational speeds). The lines are treated equally gently according to the invention. An approximate halving of the twisting time is therefore obtained for the same gentle twisting process compared to twisting devices with only one-sided twisting drive.

In a preferred embodiment In respectively one line transfer gripper is assigned to the twisting heads, which transfers the respective ends of the lines to the respective twisting head. As a result, the lines to be twisted can be successively pulled into the region between the twisting heads. Whilst one line which has already been pulled in is held by the line transfer gripper, a further line is pulled in which is then also received by the line transfer grippers. The lines to be twisted are then simultaneously transferred to the twisting heads. The successive pulling in of the lines has the advantage that the conveying means for pulling in the lines need not be designed to be double or multiple.

In a preferred embodiments each twisting head is set in rotation by a separate rotary drive. As a result, each twisting head can be acted upon with its own acceleration ramp as required.

In a preferred embodiment the rotary drives of the twisting heads are synchronised to one another. With the same rotational speeds with opposite direction of rotation, the twisting time can be reduced by the maximum, i.e. halved.

In a preferred embodiment the twisting heads are displaceable for variation of their mutual spacing relative to one another. For the purpose of this displaceability the twisting heads have their own displacement drives. As a result, on the one hand the lines can be held continuously under tension during twisting, on the other hand the twisting heads can be adapted to different line lengths.

Preferably at least one of the twisting heads sits on a displaceable carriage which is displaceable relative to the base. This constitutes a particularly simple and reliable possibility for varying the mutual spacing of the twisting heads in the longitudinal direction.

In a preferred embodiment the twisting apparatus comprises a line pull-in gripper for gripping the lines and in the region between the twisting heads, there runs a guide along which the line transfer gripper is displaceable in order to pull in the lines in the region between the twisting heads. This constitutes a simple, space-saving and reliable method for conveying the lines along their longitudinal extension in the twisting apparatus.

In a preferred embodiment the base of the twisting apparatus comprises at least two parts, wherein a second part of the base is displaceable relative to a first part of the base along a direction which is substantially parallel to the direction of displacement of the line pull-in gripper along the guide and wherein the guide with the line pull-in gripper sits on the first part of the base and one of the twisting heads sits on the second part of the base and that for positioning of the second part of the base relative to the first part of the base, the line pull-in gripper can be coupled to the second part of the base, preferably via an active interface (which otherwise brings the line pull-in gripper into an open and/or closed position) so that during a displacement along the guide the coupled line pull-in gripper drives the second part of the base relative to the first part of the base and brings it into the desired position.

By means of this measure, the spacing between the twisting heads or between the line transfer grippers can be varied in a simple manner, e.g. in order to adapt the twisting apparatus to the length of the lines to be processed. One of the twisting heads is thus displaced in a programmable manner by the line pull-in gripper into its desired position. A complete positioning axis can be saved as a result of this coupling function. The positioning is taken over by the line pull-in gripper whose control is already provided in any case.

The active interface is configured to come into operative communication with the line pull-in gripper and bring this into a closed position or open position when the line pull-in gripper is located in the active region of the active interface. The line pull-in gripper is therefore preferably coupled via this same active interface to the displaceable part of the base which is also used for opening (or closing) the line pull-in gripper.

For this purpose the active interface comprises a gripper opener or closer for opening (or closing) the line pull-in gripper.

In a preferred embodiment the twisting heads each have at least two gripper arms which can be brought from an open position into a closed position gripping the lines.

- 5 The use of gripper arms has proved to be particularly advantageous. Each twisting head therefore also has a gripper drive for opening and closing the gripper.

- The aforesaid object is also achieved by a method for twisting of electrical or optical lines such as wires, cables, line bundles, optical fibres etc. in a twisting apparatus comprising a base and a twisting head which can be rotated relative to the base,
10 wherein the lines to be twisted are gripped at their first ends by the first twisting head. It is characterised in that the twisting apparatus comprises a second twisting head which can be rotated relative to the base, which is disposed opposite the first twisting head, wherein the lines to be twisted are gripped at their second ends opposite the first ends by the second twisting head and that the two twisting heads
15 can be set in rotation in mutually opposite directions.

In a preferred embodiment, the lines to be twisted are successively pulled into the twisting apparatus between the twisting heads. As a result of the successive pulling in, the conveying device need only be provided in one design with the result that manufacturing costs can be reduced.

- 20 In a preferred embodiment, the respective ends of the lines are transferred by line transfer grippers to the respective twisting head.

- In a preferred embodiment, the lines to be twisted are held by the line transfer grippers before they are simultaneously transferred to the twisting heads. This enables a particularly process-optimised procedure since the line transfer grippers
25 perform two functions. Temporarily holding the line(s) until all the lines are pulled in and transferring the lines to the twisting heads.

- In a preferred embodiment, the spacing of the twisting heads from one another is reduced during the twisting process, preferably as a function of the rotational speed or the revolutions of the twisting heads and the resulting line entwinements of the
30 twisted line pair. As a result, the total length of the line pair (or line bundle) reduced by the twisting is compensated and a predetermined tension can be maintained.

In a preferred embodiment, the twisting heads are driven synchronised to one another.

In a preferred embodiment, the rotational speed of the twisting heads is successively increased during a first section of the twisting process. As a result, a
5 more gentle twisting process which takes account of the inertia of the lines is provided.

In a preferred embodiment, the rotational speed of the twisting heads is successively reduced during a second section of the twisting process. This also provides a treatment which is gentle on the lines.

10 In a preferred embodiment, the direction of rotation of the twisting heads at the end of the twisting process is reversed in order to obtain a twisted line pair or line bundle free from mechanical stresses.

In a preferred embodiment, the twisting apparatus comprises a line pull-in gripper for gripping the lines and that in the region between the twisting heads there runs a
15 guide along which the line pull-in gripper is displaceable in order to pull in the lines into the region between the twisting heads, and that the base of the twisting apparatus comprises at least two parts, wherein a second part of the base is displaceable relative to a first part of the base along a direction which is substantially parallel to the direction of displacement of the line pull-in gripper along
20 the guide and wherein the guide with the line pull-in gripper sits on the first part of the base and one of the twisting heads sits on the second part of the base and that for positioning of the second part of the base relative to the first part of the base the line pull-in gripper is coupled to the second part of the base, preferably via an active interface and that the coupled line pull-in gripper is displaced along the guide so that
25 the second part of the base is driven relative to the first part of the base by the line pull-in gripper and brought into the desired position. The line pull-in gripper is preferably coupled via the same active interface to the displaceable part of the base which is also used for opening the line pull-in gripper.

Advantageous further developments of the invention are presented in the figures
30 and in the dependent patent claims.

Further advantages, features and details of the invention are obtained from the following description in which exemplary embodiments of the invention are described with reference to the drawings. In this case, the features mentioned in the claims and in the description can in each case be essential to the invention

5 individually by themselves or in any combination.

The reference list is part of the disclosure. The figures are described cohesively and in an overlapping manner. The same reference numbers denote the same components, reference numbers with different indices specify functionally the same or similar components.

10 In the figures:

Fig. 1 shows an embodiment of a twisting apparatus according to the invention

Fig. 2 shows schematically a twisting apparatus in a view which emphasises the function,

Fig. 3 shows an embodiment of a twisting apparatus.

15 Figure 1 shows a twisting apparatus 1 according to the invention comprising a base 5 in the form of a base frame. A first twisting head 3 and a second twisting head 4 are disposed on this base 5 spaced apart from one another and opposite one another. The lines 2 to be twisted are clamped between the twisting heads 3, 4.

The base 5 preferably comprises a first stationary part 5a, e.g. a substructure
20 mounted fixedly to the frame (in Fig. 1 left) and a second part 5b which is displaceable in the longitudinal direction, e.g. a wagon or carriage, by which means the distance between the active interfaces can be varied and which is positioned or fixed according to the line length to be twisted. The direction of travel is indicated by a double arrow in Fig. 1. The displaceable part 5b of the base 5 can be fixed on the
25 stationary part of the base 5, i.e. can be locked in the desired position.

The lines 2 are pulled into the twisting apparatus 1 in direction F. This is accomplished by means of a line pull-in gripper 10 which is displaceable along a guide 11 in the form of a linear rail. During pulling in of the lines 2, the line pull-in gripper 10 moves from left to right. When the first end of a line 2 has arrived in the
30 region of the first twisting head 3, a line transfer gripper 6 receives the first end of

the line 2 and transfers it to the first twisting head 3. This grips the preferably successively pulled-in lines at their first end and holds them fixed during the twisting process.

The second end of the line 2 opposite the first end is gripped in a similar manner by a line transfer gripper 7 provided in the region of the second twisting head 4 and transferred to the second twisting head 4.

Each twisting head 3, 4 has its own rotary drive 8, 9 by which means the respective twisting head is set in rotation.

Preferably one of the twisting heads - in Fig. 1 this is the (right) twisting head 3 - sits on a carriage 15 which is displaceable relative to the base 5 along the longitudinal direction (i.e. parallel to the axis of rotation of the twisting heads). In the exemplary embodiment of Fig. 1 the carriage 15 is mounted on the displaceable second part 5b of the base 5 and is longitudinally displaceable relative to this. During the twisting process the twisting head 3 can successively follow the shortening of the twisting line. This adaptation of the twisting head to the varying line length can be accomplished by an own displacement drive.

Figure 2 shows in a schematic view which emphasises the function of the invention, a twisting apparatus 1 with the two twisting heads 3, 4 in which two lines 2 are clamped. The twisting heads 3, 4 are mounted on the base in such a manner that they substantially rotate about the same axis of rotation 12.

In the embodiment shown each twisting head 3, 4 has two gripper arms 13, 14 which can be brought from an open position which receives the line ends into a closed position which fixes the line ends. The closing movement of the gripper arms 13, 14 is indicated by the arrows depicted in the region of the gripper arms 13, 14.

When the first and second line ends are fixed in the opposite twisting heads 3, 4, the twisting process begins. In this case, both twisting heads 3, 4 are set in rotation in opposite directions. The opposite directions of rotation are indicated by the orientation arrows depicted in the left and right margin region of Fig. 2. The duration of the twisting process can be reduced by a half as a result of the contra-rotating twisting heads 3, 4.

A possible function sequence in a twisting apparatus according to the invention is explained in detail in the following.

The basic machine (called CrimpCenter at Schleuniger) initially conveys a line 2 into the twisting apparatus 1 by means of a line feed device (indicated by the arrow F shown on the left in Fig. 1). This line 2 has preferably already been fitted with a contact, e.g. by crimping, at its first right-hand end.

The line pull-in gripper 10 grips the leading first line end (in the region of the active interface Z, which brings the line pull-in gripper 10 with a gripper closer into the closed gripping position) and conveys the line 2 synchronized with the line feed device (merely indicated by the arrow F) of the basic machine to an active interface Y which comprises a gripper opener for opening the line pull-in gripper 10. Here the line transfer gripper X receives the first line end and the line pull-in gripper 10 travels back opened in order to receive the next line 2.

The trailing second line end is now also fitted with a contact, e.g. by crimping and is then transferred with the aid of additional handling mechanics to the second line transfer gripper 7. In the course of this transfer the line transfer gripper X moves the leading line end of the first line from the active interface Y to the right to the line transfer gripper 6. The movements of the line transfers on the first and second side of the twisting apparatus 1 are matched to one another in such a manner that the respective line 2 remains taut with little sagging.

The line transfer grippers 6, 7 preliminarily hold this first line 2 at its ends. In the meantime, in the line changer of the basic machine a changeover to the next line has taken place. This now conveyed by the line feed device (arrow F) in the direction of the twisting apparatus 1. The leading line end is provided with a contact. This second line is now pulled into the twisting apparatus 1 by the line pull-in gripper 10 similarly to the first line (as described above) and is there also transferred to the line transfer grippers 6, 7.

Two lines 2 are now already located in the line transfer grippers 6, 7 for the transfer to the twisting heads 3, 4.

After transfer of the two lines 2 into the clamping tongs of the twisting heads 3, 4, the actual twisting process begins. Both twisting heads 3, 4 are set in rotation in

opposite directions in a programmed manner, are accelerated until the final rotational speed and the pre-programmed number of revolutions is reached. Then they are driven with a delaying ramp. At the end of the twisting process the directions of rotation of both twisting heads 3, 4 are reversed, i.e. they are each
 5 turned back in the opposite direction in a pre-programmed manner so that the twisted line pair contains no outwardly acting stresses.

During the twisting process the lines 2 are exposed to a defined tensile force in the axial direction so that the desired twisting result is achieved and on the other hand, the lines 2 are not damaged. Then the gripper arms 13, 14 or clamping tongs of the
 10 twisting heads 3, 4 are opened and the twisted finished line pair drops into a depositing tray (not shown on account of clarity).

Figure 3 is a schematic view which is simplified compared to Fig. 1 and shows an embodiment of the invention in which again the base 5 of the twisting apparatus 1 comprises at least two parts 5a, 5b. A second part 5b of the base 5 is displaceable
 15 relative to a first part 5a of the base 5 along a direction which is substantially parallel to the direction of travel of the line pull-in gripper 10 along the guide 11. The guide 11 with the line pull-in gripper 10 sits on the first part 5a of the base 5 and one of the twisting heads 3 (the right-hand one in Fig. 3) sits on the second part 5b of the base 5.

20 In order to adapt the twisting apparatus to the line length at the beginning of the twisting process, for positioning the second part 5b of the base 5 relative to the first part 5a of the base 5 the line pull-in gripper 10 is coupled to the second part 5b of the base 5. This is preferably accomplished via the active interface Y to which the line pull-in gripper 10 is brought so that the active interface Y can fix the line pull-in
 25 gripper 10, e.g. by a gripping movement. The coupled line pull-in gripper 10 is now moved along the guide 11 and entrains the second part 5b of the base 5 with it. The second part 5a is now driven relative to the first part 5a of the base 5 and brought into the desired position. The line pull-in gripper 10 is then uncoupled again. A brake 16 is provided to lock the second part of the base in the desired position.

30 In other words: for setting up the machine to the desired line length, the displaceable part 5b must be re-positioned. To this end the line pull-in gripper 10 initially travels without the line to the active interface Y. The coupling takes place in this position.

The brake 16 of the displaceable part 5b is then released. The (indirect) coupling of the line pull-in gripper 10 to the second part 5b now enables this to be displaced into the new position with the aid of the linear axis of the line pull-in gripper 10. There the brake 16 of the second part 5b is again fixed and the line pull-in gripper 10
5 uncoupled. The twisting apparatus 1 with the line pull-in gripper 10 is now ready to draw in new lines to be twisted.

In the example in Fig. 3 the second part 5b of the base is mounted directly on the first part 5a of the base. Alternatively the second part 5b of the base could also be mounted on the guide 11 and can be displaced along the guide 11 and locked. The
10 expressions 'first and second part of the base' should therefore be understood in the broadest sense.

As can be seen from Fig. 3, at least one active interface Z preferably comprises a piston unit 17, preferably a pneumatic cylinder in order to bring the line pull-in gripper 10 into a closed position (or open position), where the supply pressure for
15 the cylinder-piston unit 17 is variably adjustable by a controller 18.

The disclosure of the following applications: S124PWO, S125PWO, S126PWO, S127PWO (Internal file reference of the applicant), which were all deposited at the International Bureau (IB) on 9.11.2012, form an integral component of the present application and should be seen in combination with the same since these separate
20 applications each relate to different aspects of the same machine. Further synergistic effects result from this.

Reference list

- 1 Twisting apparatus
- 2 Lines
- 5 3 First twisting head
- 4 Second twisting head
- 5 Base
- 5a First part of base 5
- 5b Second part of base 5
- 10 6 First line transfer gripper
- 7 Second line transfer gripper
- 8 Rotary drive for first twisting head 3
- 9 Rotary drive for second twisting head 4
- 10 Line pull-in gripper
- 15 11 Guide for line pull-in gripper 10
- 12 Axis of rotation of twisting heads
- 13 Gripper arms of first twisting head 3
- 14 Gripper arms of second twisting head 4
- 15 Carriage
- 20 16 Brake
- X Line transfer gripper
- Y Active interface with gripper opener
- Z Active interface with gripper closer

Patent claims

1. Twisting apparatus (1) for twisting of electrical or optical lines (2) such as wires, cables, line bundles, optical fibres etc. in particular a cable twisting apparatus, comprising a base (5) and a twisting head (3) which can be rotated relative to the base (5), which is configured to grip the lines (2) to be twisted at their first ends, **characterised in that** the twisting apparatus (1) comprises a second twisting head (4) which can be rotated relative to the base (5), which is disposed opposite the first twisting head (3) and which is configured to grip the lines (2) to be twisted at their second ends opposite the first ends and that the second twisting head (3) can be rotated in the opposite direction to the second twisting head (4).
2. The twisting apparatus according to claim 1, **characterised in that** respectively one line transfer gripper (6, 7) is assigned to the twisting heads (3, 4), which transfers the respective ends of the lines (2) to the respective twisting head (3, 4).
3. The twisting apparatus according to claim 1 or 2, **characterised in that** each twisting head (3, 4) can be set in rotation by a separate rotary drive (8, 9), wherein preferably the rotary drives (8, 9) of the twisting heads (3, 4) are synchronised to one another.
4. The twisting apparatus according to any one of claims 1 to 3, **characterised in that** the twisting heads (3, 4) are displaceable for variation of their mutual spacing relative to one another, wherein preferably at least one of the twisting heads (3, 4) sits on a carriage (15) which is displaceable relative to the base (5).
5. The twisting apparatus according to any one of claims 1 to 4, **characterised in that** the twisting apparatus (1) comprises a line pull-in gripper (10) for gripping the lines (2) and that in the region between the twisting heads (3, 4), there runs a guide (11) along which the line pull-in gripper (10) is displaceable in order to pull in the lines (2) in the region between the twisting heads (3, 4).
6. The twisting apparatus according to claim 5, **characterised in that** the base (5) of the twisting apparatus (1) comprises at least two parts (5a, 5b), wherein

a second part (5b) of the base (5) is displaceable relative to a first part (5a) of the base (5) along a direction which is substantially parallel to the direction of displacement of the line pull-in gripper (10) along the guide (11) and wherein the guide (11) with the line pull-in gripper (10) sits on the first part (5a) of the base (5) and one of the twisting heads (3) sits on the second part (5b) of the base (5) and that for positioning of the second part (5b) of the base (5) relative to the first part (5a) of the base (5), the line pull-in gripper (10) can be coupled to the second part (5b) of the base (5), preferably via an active interface (Y) so that during a displacement along the guide (11) the coupled line pull-in gripper (10) drives the second part (5b) of the base (5) relative to the first part (5a) of the base (5) and brings it into the desired position.

7. The twisting apparatus according to any one of claims 1 to 6, **characterised in that** the twisting heads (3, 4) each have at least two gripper arms (13, 14) which can be brought from an open position into a closed position gripping the lines (2).

8. Method for twisting of electrical or optical lines (2) such as wires, cables, line bundles, optical fibres etc. in a twisting apparatus (1) comprising a base (5) and a twisting head (3) which can be rotated relative to the base (5), wherein the lines (2) to be twisted are gripped at their first ends by the first twisting head (3), **characterised in that** the twisting apparatus (1) comprises a second twisting head (4) which can be rotated relative to the base (5), which is disposed opposite the first twisting head (3) wherein the lines (2) to be twisted are gripped at their second ends opposite the first ends by the second twisting head (4) and that the two twisting heads (3, 4) can be set in rotation in mutually opposite directions.

9. The method according to claim 8, **characterised in that** the lines (2) to be twisted are successively pulled into the twisting apparatus (1) between the twisting heads (3, 4).

10. The method according to claim 8 or 9, **characterised in that** the respective ends of the lines (2) are transferred by line transfer grippers (6, 7) to the respective twisting head (3, 4), wherein preferably the lines (2) to be twisted

are held by the line transfer grippers (6, 7) before they are simultaneously transferred to the twisting heads (3, 4).

11. The method according to any one of claims 8 to 10, **characterised in that** the spacing of the twisting heads (3, 4) from one another is reduced during the twisting process, preferably as a function of the revolutions of the twisting heads (3, 4).

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12. The method according to any one of claims 8 to 11, **characterised in that** the twisting heads (3, 4) are driven synchronised to one another and/or the rotational speed of the twisting heads (3, 4) is successively increased during a first section of the twisting process.

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13. The method according to any one of claims 8 to 12, **characterised in that** the rotational speed of the twisting heads (3, 4) is successively reduced during a second section of the twisting process.
14. The method according to any one of claims 8 to 13, **characterised in that** the direction of rotation of the twisting heads (3, 4) at the end of the twisting process is reversed.

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15. The method according to any one of claims 8 to 14, **characterised in that** the twisting apparatus (1) comprises a line pull-in gripper (10) for gripping the lines (2) and that in the region between the twisting heads (3, 4) there runs a guide (11) along which the line pull-in gripper (10) is displaceable in order to pull in the lines (2) into the region between the twisting heads (3, 4), and that the base (5) of the twisting apparatus (1) comprises at least two parts (5a, 5b), wherein a second part (5b) of the base (5) is displaceable relative to a first part (5a) of the base (5) along a direction which is substantially parallel to the direction of displacement of the line pull-in gripper (10) along the guide (11) and wherein the guide (11) with the line pull-in gripper (10) sits on the first part (5a) of the base (5) and one of the twisting heads (3) sits on the second part (5b) of the base (5) and that for positioning of the second part (5b) of the base (5) relative to the first part (5a) of the base (5) the line pull-in gripper (10) is coupled to the second part (5b) of the base (5), preferably via an active interface (Y) and that the coupled line pull-in gripper (10) is displaced along the guide (11) so that the second part (5b) of the base (5) is driven relative to

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the first part (5a) of the base (5) by the line pull-in gripper (10) and brought into the desired position.