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(54) METHOD AND DEVICE FOR TENSIONING A CORD WHEN JOINING TOGETHER TWO OR MORE ARTICLES

VERFAHREN UND VORRICHTUNG ZUM SPANNEN EINES KABELS BEI DER VERBINDUNG VON ZWEI ODER MEHREREN ARTIKELN

PROCEDE ET APPAREIL PERMETTANT DE TENDRE UN CABLE LORS DE L'ASSEMBLAGE DE DEUX ARTICLES OU PLUS

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US-A- 1 435 071 **US-A- 4 449 429**

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Description

TECHNICAL FIELD:

The present invention relates to a method for joining together two or more articles using a flexible cord which is wound at least twice around at least a part of said articles to form a knot. The invention further relates to a device which is suitable for carrying out the method. The method is particularly intended for use in the fishing industry for binding nets to support lines and chains.

BACKGROUND OF THE INVENTION:

Fishing nets used in trawling are made up of several net sections which are joined to each other via a ripline. Depending on the material of the ripline and its application, the ripline normally has a diameter of between 10 mm and 35 mm, though is typically around 28 mm. Edge regions of the net sections are gathered to form selvedges which are then bound to the ripline using a woven cord of around 4 mm diameter. The binding operation is performed manually at distinct locations along the ripline. The operation consists of threading the cord on a dolly and passing the dolly through a mesh in the net adjacent the selvedge and around the rope several dozen times at each location. After each winding, the cord must be pulled tight. The operation is completed by passing the dolly under one or more windings to secure the bind. The net also comprises a so-called bolseline bound in the manner described above to the lower leading edge of the net. To this bolseline is further bound a steel chain, typically of HLC 13-8 dimensions, which is attached to the hauling gear of the trawler. The net may also be provided with a footrope to which gear such as rockhopper gear can be shackled.

Due to the many hundreds of bindings which are necessary to assemble a fishing net, the assembly task is very labour-intensive and time-consuming. Whilst the net itself can be assembled on dry land, it must be attached to the hauling gear of the trawler on the boat. In addition, if a section of net needs to be replaced, this may have to be performed at sea.

In order to be able to exchange sections of netting or to replace gear, the bindings must be quickly releasable. This implies that the cord used for the bindings must be cuttable with a bladed instrument, thereby ruling out the possibility of using a wire-wound binding or similar.

Devices are known from e.g. US-A-1 435 071, US-A-1 181 191 and US-A-1 072 301 for applying a wire hose clamp to a length of hosing, whilst US-A-4 202 384 and US-A-3 254 680 describe devices for installing self-locking straps. In addition, a device for applying a piece of elastic to a lampshade is disclosed in FR-A-2 311 126. None of these devices are, however, suitable for applications contemplated by the present invention.

SUMMARY OF THE INVENTION:

It is therefore an object of the invention to provide a method for joining together two or more articles using a flexible cord, which method is quicker and less labour-intensive than previous methods.

The method according to the present invention makes use of a flexible cord which is wound at least twice around at least a part of the articles to form a knot. The method is characterized in that the articles are components of trawler fishing equipment, and in that the knot is influenced by mechanical means to create a tension in the knot of the order of at least several hundred Newtons.

Since the cord need only be wound twice around the articles, no dolly is required and the entire binding operation can be completed in a fraction of the time previously taken. In order to ensure that the knot is sufficiently secure, a mechanical device can be quickly connected to one end of the cord to pull the cord tight to a predetermined tension.

It is thus a further object of the invention to provide a device suitable for carrying out the tensioning phase of the method according to the invention.

In accordance with the invention, the device comprises a stationary member which during use is stationary with respect to the articles around which the cord is wound, the stationary member being provided with an abutment member for abutment against at least one of the articles which are to be joined, the abutment member presenting two spaced-apart adjacent jaw members, each jaw member being provided with a substantially U-shaped opening for accommodating at least a portion of at least one of said articles which are to be joined; and means associated with the stationary member for holding the cord and displacing it with respect to the stationary member.

Further advantageous embodiments of the method and apparatus according to the present invention are detailed in the respective dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS:

The invention will be described in more detail in the following by way of example only and with reference to the attached drawings in which:

- Fig. 1 shows a number of net sections making up a typical trawler net;
- Fig. 2 shows a section of netting to which is attached a bolseline and steel chain using a prior art method;
- Fig. 3 shows a section of netting to which is attached a bolseline and steel chain using the method according to the present invention;
- Fig. 4 illustrates a knot suitable for use in the method according to the present invention;
- Fig. 5 is a schematic perspective view of a first ap-

paratus for carrying out the method according to the invention;

Fig. 6 is a schematic perspective view of the apparatus according to Fig. 5 in use, and

Fig. 7 is a schematic plan view of a second apparatus for carrying out the method according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS:

The partial net shown in Fig. 1 is of the Whitefish-trawl model "Bering Sea" type made from braided polyethylene netting. It is to be noted that only the front region of the net is shown in Fig. 1. The partial net comprises two main sections, i.e. a lower section 1 and an upper section 2. The sections are joined to each other along their adjacent edges via riplines 3 (two shown in the drawing) of around 28 mm karat rope. The lower net section 1 is further provided with a bolseline 4 at its leading edge 5. This line 4 may similarly be 28 mm karat rope. In order to weigh down the leading edge 5 of the net during trawling, a chain 6 is affixed to the bolseline 4. The chain 6 also serves as an attachment for rock-hopper gear (not shown). As denoted by reference numeral 7, the leading edge of the upper net section 2 is provided with a combination rope of around 24 mm diameter.

Due to the large number of sections which make up a complete fishing net, a great many ropes need to be attached to the net. Since due to wear and tear it is often necessary to exchange certain net sections, these ropes must be removable in a simple manner from the net sections. It is desirable therefore if the ropes can be removed by cutting through their bindings to the net by means of a bladed instrument such as a knife.

The most common prior art means for attaching a rope to a net section is shown in Fig. 2. More specifically, Fig. 2 shows a part of the lower section 1 of netting to the leading edge 5 of which a bolseline 4 and a chain 6 are attached. The leading edge 5 is formed by gathering up a length of netting to form a selvage and then securing it to the bolseline 4 at intervals along the line by means of wound bindings 7. Similarly, the chain 6 is attached to the bolseline 4 at intervals therealong by means of wound bindings 8. The wound bindings 7 and 8 are achieved by threading a woven cord of around 4 mm diameter on a dolly and then passing the dolly through a mesh in the net and around the bolseline several dozen times at each location. After each winding, the cord must be pulled tight to maintain the required tension in the binding. The operation is completed by passing the dolly under one or more windings to secure the binding.

Fig. 3 illustrates a section of netting corresponding to that shown in Fig. 2, though in which the bindings between the net 1, bolseline 4 and chain 6 are achieved in accordance with the present invention. The bindings

9 are achieved by winding a length of cord 10 (see Fig. 4) at least twice around at least parts of the articles to be joined to form a knot. The knot shown in the drawings and most clearly illustrated in Fig. 4 is a so-called clove hitch, though it will be apparent that many other types of knot may also be suitable. In contrast to the cord used in the prior art, the cord used to form the knot in the method according to the present invention may be somewhat thicker, for example 14 mm.

10 In accordance with the present invention, the cord is wound to form a knot and is then influenced by mechanical means to create a tension in the knot of the order of at least several hundred Newtons, preferably between 1.000N and 50.000N, though normally between 1.500 and 5.000N. In order to facilitate the binding operation on board ship, it is advantageous if the mechanical means for producing the desired tension in the knot is portable and hand-held. Devices suitable for performing the method according to the present invention are shown in Figs. 5, 6 and 7. The device illustrated in Figs. 5 and 6 is generally denoted by reference numeral 11 and comprises a generally cylindrical, hand-held housing 12 within one end of which a motor 13 is accommodated. The motor 13 may be driven electrically, hydraulically or pneumatically. The motor 13 drives a worm gear arrangement 14 or similar within the housing 12. The worm gear arrangement converts the rotational motion of the motor into translational displacement of an elongated rod 15. The device is so constructed that, in an initial position, the elongated rod 15 is substantially entirely accommodated within the housing 12. When the motor 13 is activated to operate in a first direction, the rod 15 is caused to extend from the housing 12 in a direction away from the motor 13, as shown in Fig. 6. Conversely, when the direction of rotation of the motor 13 is reversed, the rod 15 is caused to be retracted towards its initial position. The amount which the rod 15 is caused to extend from the housing 12, i.e. the stroke of the device, is selected depending on its intended use, though preferably lies between 100 and 300 mm.

At the end of the rod 15 remote from the motor 13 there is arranged an abutment member generally denoted by reference number 16. The abutment member 16 may be secured to the rod 15 by any suitable means, such as by welding or by means of a bolt passing through the abutment member and engaging with internal threads in a bore in the end of the rod 15. Preferably, though, the abutment member is releasable to facilitate exchange thereof. The abutment member 16 comprises two adjacent jaw members 17, separated by a distance d. Each jaw member 17 is provided with a substantially U-shaped opening 18 of a certain width w and depth 1. The values of the distance d, the width w and the depth 1 are selected depending on the intended field of application of the device. For example, in the fishing industry where such a device is intended to secure bindings between the net, bolseline and chain as illustrated in Fig. 3, the distance d can suitably vary between 30 and 60

mm, the width *w* between 35 and 65 mm, and the depth 1 between 45 and 75 mm. Advantageously, the distance *d* is greater between the jaws 17 at the upper region of the abutment member than at the lower region.

It is of course conceivable that the device 11 be provided with a selection of abutment members 16 of differing sizes.

On the housing 12 in the vicinity of the end from which the rod 15 extends, there is provided gripping means 20, for example in the form of two opposed gripping members 21 resiliently biased towards each other. The gripping means 20 is intended to grip at least one end of the cord 10 which for example forms the knot illustrated in Fig. 4. The gripping means 20 may instead be in the form of a forwardly inclined capped peg around which the ends of the cord 10 can be wrapped.

In operation, the cord 10 is wrapped at least twice around the articles to be joined to form a knot. Thereafter, the abutment member 16 on the rod 15 is placed against one or more of the articles to be joined so that at least a portion of at least one of the articles is accommodated within the openings 18 of the jaw members 17. One, though preferably both, end of the cord 10 is then inserted in the gripping means 20. Upon actuation of the motor 13, the housing 12 and thereby the gripping means 20 are displaced away from the knot, as shown in Fig. 6, to impart a tension in the cord 10. When the knot is suitably taut, the cord 10 can be severed along its length between the knot and the gripping means 20.

The device illustrated in Fig. 7 is generally denoted by reference numeral 30 and comprises a substantially Y-shaped housing 31. To one branch of the housing there is rigidly attached an abutment member 16 of the type described with relation to the embodiment shown in Figs. 5 and 6. On the other branch of the housing 31 opposite the abutment member 16, a handle 32 is provided. A motor 13 having a spindle 33 is arranged within the housing 31 in such a manner that the spindle 33 of the motor projects from the housing and extends transversely to an imaginary line joining the abutment member 16 with the handle 32. Gripping means 20 is provided on the spindle 33 and is arranged for rotation therewith. The gripping means 20 is suitably in the form of a split pulley 34, the two halves of which can be brought together to thereby clamp an item placed therebetween. In the present case, such an item would be the ends of the cord 10.

When operating the device according to Fig. 7, the cord 10 is wrapped at least twice around the articles to be joined to form a knot. Thereafter, the abutment member 16 on the housing 31 is placed against one or more of the articles to be joined so that at least a portion of at least one of the articles is accommodated within the openings 18 of the jaw members 17. One or both ends of the cord 10 are then inserted in the gripping means 20. Upon actuation of the motor 13, the gripping means 20 is caused to rotate to impart a tension in the cord 10. When the knot is suitably taut, the cord 10 can be sev-

ered along its length between the knot and the gripping means 20.

The invention is not restricted to that described above or shown in the drawings, but may instead be varied within the scope of the appended claims. For example, the invention may effectively be used within the scope of the independent claims in many different applications in which a bound joint is required. Rather than a powered motor being used, it is conceivable that a mechanically-actuated ratchet arrangement be adopted.

Claims

1. A method for joining together two or more articles (1,4,6) using a flexible cord (10) which is wound at least twice around at least a part of said articles to form a knot (9), **characterized in** that said articles are components of trawler fishing equipment, and in that said knot is influenced by mechanical means (11) to create a tension in said knot of the order of at least several hundred Newtons.
2. The method according to claim 1, **characterized in** that the cord (10) is wound manually around said articles and that said mechanical means is in the form of a hand-held tool.
3. A device for tensioning a flexible cord (10) which is wound at least twice around two or more articles to be joined, said device comprising:
 - a stationary member (15) which during use is stationary with respect to the articles around which the cord (10) is wound, said stationary member being provided with an abutment member (16) for abutment against at least one of the articles which are to be joined, said abutment member (16) presenting two spaced-apart adjacent jaw members (17), each jaw member being provided with a substantially U-shaped opening (18) for accommodating at least a portion of at least one of said articles which are to be joined; and
 - means (20,12,13) associated with said stationary member (15) for holding the cord and displacing it with respect to the stationary member (15).
4. The device according to claim 3, **characterized in** that said stationary member is a rod (15) having said abutment member (16) at one end, and said means for holding the cord (10) and displacing it with respect to the stationary member is in the form of a housing (12) into which the rod (15) passes, which housing is provided with holding means (20) for holding at least one end of the cord used to form the knot and means (13,14) for displacing the hous-

ing along the rod.

5. The device according to claim 3, **characterized in** that said stationary member is a housing (31) having said abutment member (16), and said means (20) for holding the cord and displacing it with respect to the stationary member is rotationally carried on said housing (31).
6. The device according to claim 4, **characterized in** that said means for displacing the housing (12) along the rod (15) comprises a worm-gear arrangement (14).
7. The device according to claim 4 or 5, **characterized in** that said means for displacing the housing along the rod is electrically, hydraulically or pneumatically driven.

Patentansprüche

1. Verfahren zum Verbinden von zwei oder mehr Gegenständen (1, 4, 6) miteinander unter Verwenden eines flexiblen Stricks (10), der wenigstens zweimal um wenigstens einen Teil der Gegenstände gewickelt wird, um einen Knoten (9) zu bilden, dadurch gekennzeichnet, daß es sich bei den Gegenständen um Bestandteile einer Schleppnetz-Fischausrüstung handelt, und daß der Knoten durch mechanische Mittel (11) beeinflußt wird, um eine Spannung in dem Knoten der Größenordnung von wenigstens mehreren hundert Newton zu erzeugen.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Strick (10) manuell um die Gegenstände gewickelt wird, und daß die mechanische Einrichtung in Form eines handgehaltenen Werkzeugs vorliegt.
3. Vorrichtung zum Festziehen eines flexiblen Stricks (10) der wenigstens zweimal um zwei oder mehr Gegenstände gewickelt ist, die verbunden werden sollen, wobei die Vorrichtung umfaßt:

ein stationäres Element (15), das während der Verwendung in Bezug auf die Gegenstände stationär ist, um welche der Strick (10) gewickelt ist, wobei das stationäre Element mit einem Widerlagerelement (16) zur Anlage gegen wenigstens einen der Gegenstände, die verbunden werden sollen, versehen ist, wobei das Widerlagerelement (16) zwei voneinander beabstandete benachbarte Klauenelemente (17) aufweist, wobei jedes Klauenelement mit einer im wesentlichen U-förmigen Öffnung (18) zum Aufnehmen von wenigstens einem Abschnitt von wenigstens einem der Gegenstände ver-

sehen ist, die verbunden werden sollen, und eine Einrichtung (20, 12, 13), die dem stationären Element (15) zum Halten des Seils sowie zum Verschieben desselben in Bezug auf das stationäre Element (15) zugeordnet ist.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß das stationäre Element eine Stange (15) ist, die das Widerlagerelement (16) an einem Ende aufweist, und die Einrichtung zum Halten des Seils (10) und zum Verschieben desselben in Bezug auf das stationäre Element in der Form eines Gehäuses (12) vorliegt, in welches hinein die Stange (15) verläuft, wobei das Gehäuse mit einer Halteeinrichtung (20) zum Halten von wenigstens einem Ende des Seils versehen ist, das zum Bilden des Knotens verwendet wird, und eine Einrichtung (13, 14) zum Verschieben des Gehäuses entlang der Stange.

5. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß das stationäre Element ein Gehäuse (31) ist, welches das Widerlagerelement (16) aufweist, und die Einrichtung (20) zum Halten des Seils und zum Verschieben desselben in Bezug auf das stationäre Element auf dem Gehäuse (31) drehbar getragen ist.

6. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Einrichtung zum Verschieben des Gehäuses (12) entlang der Stange (15) eine Schneckenradanordnung (14) umfaßt.

7. Vorrichtung nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß die Einrichtung zum Verschieben des Gehäuses entlang der Stange elektrisch, hydraulisch oder pneumatisch angetrieben ist.

40 Revendications

1. Procédé de liaison d'au moins deux articles (1, 4, 6) à l'aide d'un cordon souple (10) enroulé au moins deux fois autour d'une partie au moins des articles pour la formation d'un noeud (9), caractérisé en ce que les articles sont des éléments d'un appareillage de pêche au chalut, et en ce que le noeud est influencé par un dispositif mécanique (11) destiné à créer dans le noeud une tension de l'ordre d'au moins quelques centaines de newtons.

2. Procédé selon la revendication 1, caractérisé en ce que le cordon (10) est enroulé manuellement autour des articles, et le dispositif mécanique est sous forme d'un outil manuel.

3. Appareil de mise sous tension d'un cordon souple (10) enroulé au moins deux fois autour d'au moins

deux articles à raccorder, le dispositif comprenant :

un organe fixe (15) qui, pendant l'utilisation, est fixe par rapport aux articles autour desquels le cordon (10) est enroulé, l'organe fixe comprenant un organe de butée (16) destiné à être en butée contre l'un au moins des articles qui doivent être reliés, l'organe de butée (16) présentant deux organes adjacents mais distants (17) de mâchoire, chaque organe de mâchoire ayant une ouverture pratiquement en U (18) destinée à loger une partie au moins de l'un au moins des articles qui doivent être reliés, et un dispositif (20, 12, 13) associé à l'organe fixe (15) et destiné à maintenir le cordon et à le déplacer par rapport à l'organe fixe (15).

4. Appareil selon la revendication 3, caractérisé en ce que l'organe fixe est une tige (15) ayant un organe de butée (16) à une première extrémité, et le dispositif de maintien du cordon (10) et de déplacement du cordon par rapport à l'organe fixe est sous forme d'un boîtier (12) dans lequel passe la tige (15), ce boîtier comprenant le dispositif (20) de maintien d'au moins une première extrémité du cordon utilisé pour la formation du noeud, et un dispositif (13, 14) de déplacement du boîtier le long de la tige.
5. Appareil selon la revendication 3, caractérisé en ce que l'organe fixe est un boîtier (31) ayant un organe (16) de butée, et le dispositif (20) de maintien du cordon et de déplacement du cordon par rapport à l'organe fixe est supporté sur le boîtier (31) afin qu'il puisse tourner.
6. Appareil selon la revendication 4, caractérisé en ce que le dispositif de déplacement du boîtier (12) le long de la tige (15) comprend un ensemble (14) à engrenage à vis sans fin.
7. Appareil selon la revendication 4 ou 5, caractérisé en ce que le dispositif de déplacement du boîtier le long de la tige est entraîné électriquement, hydrauliquement ou pneumatiquement.

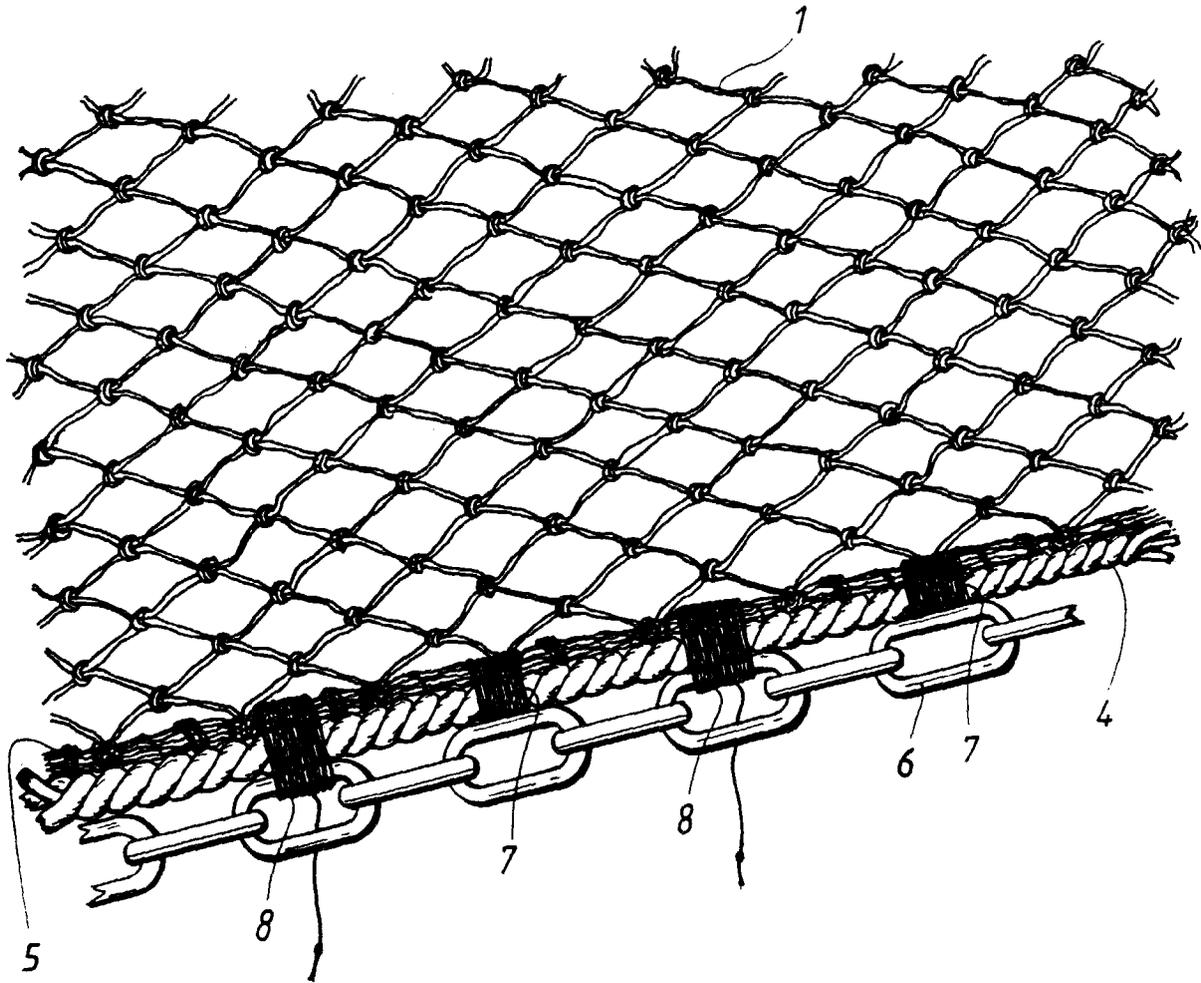


FIG.2

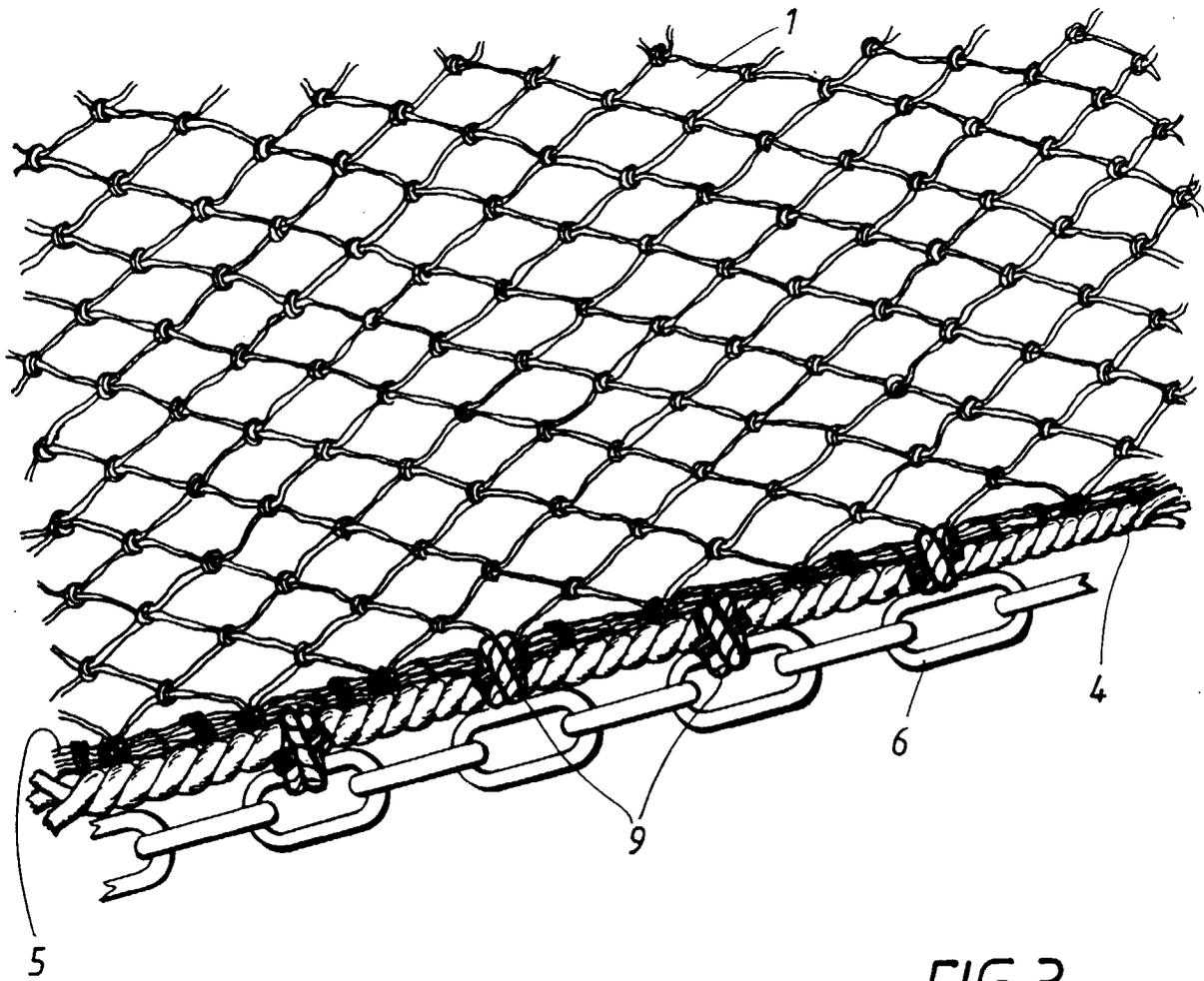


FIG. 3

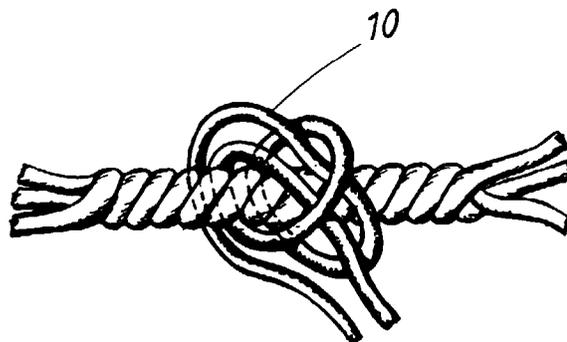
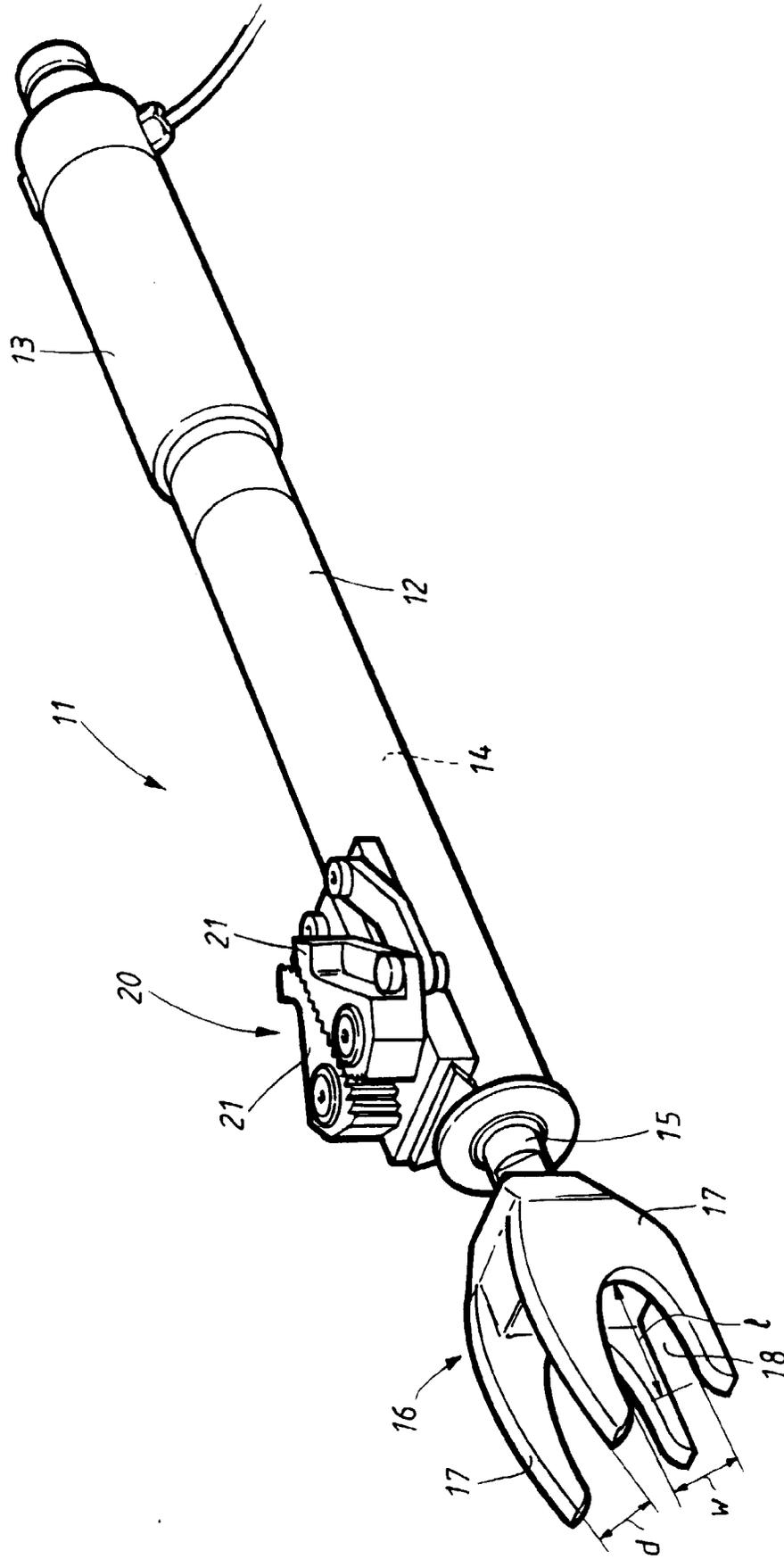


FIG. 4



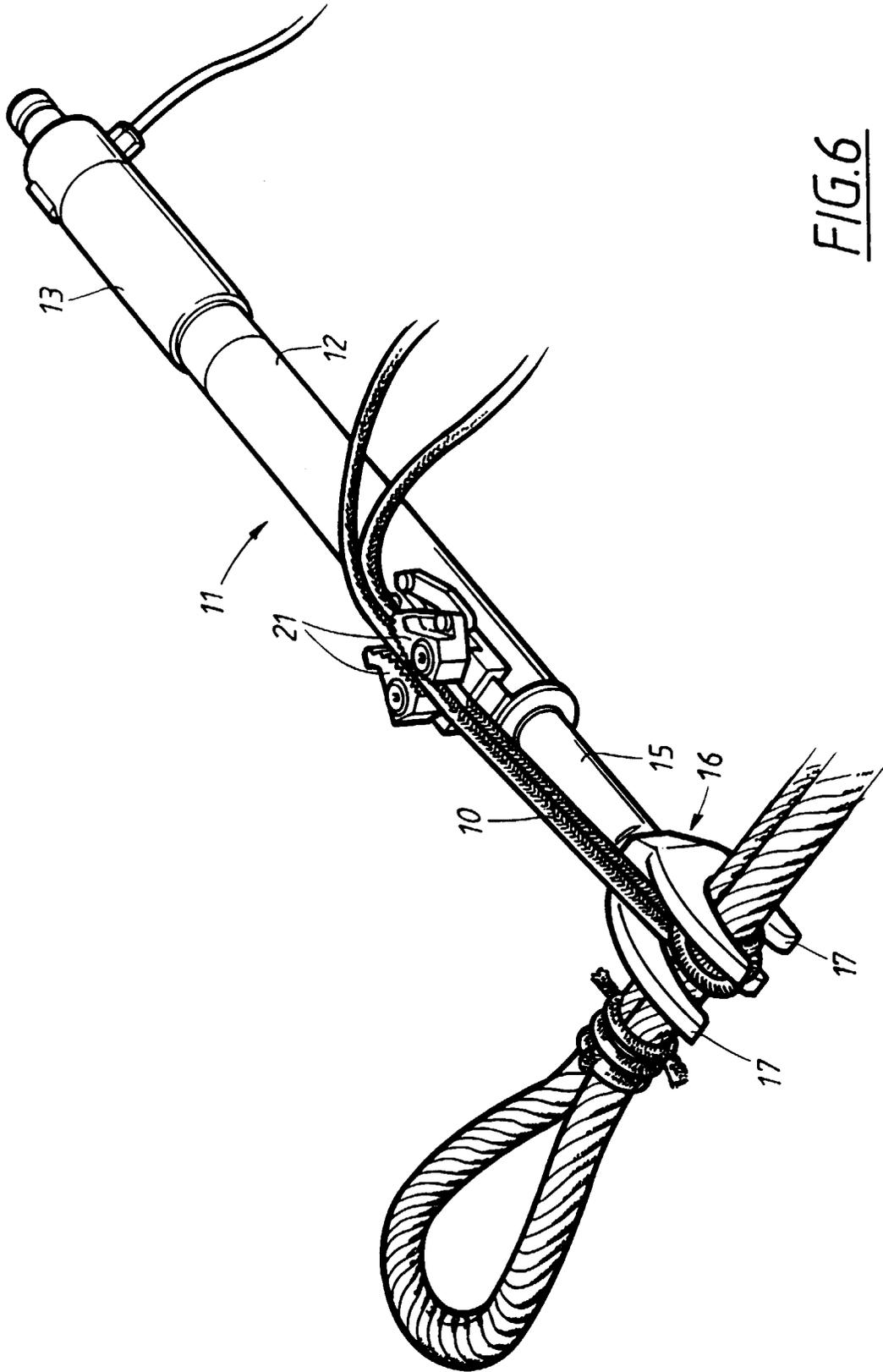


FIG.6

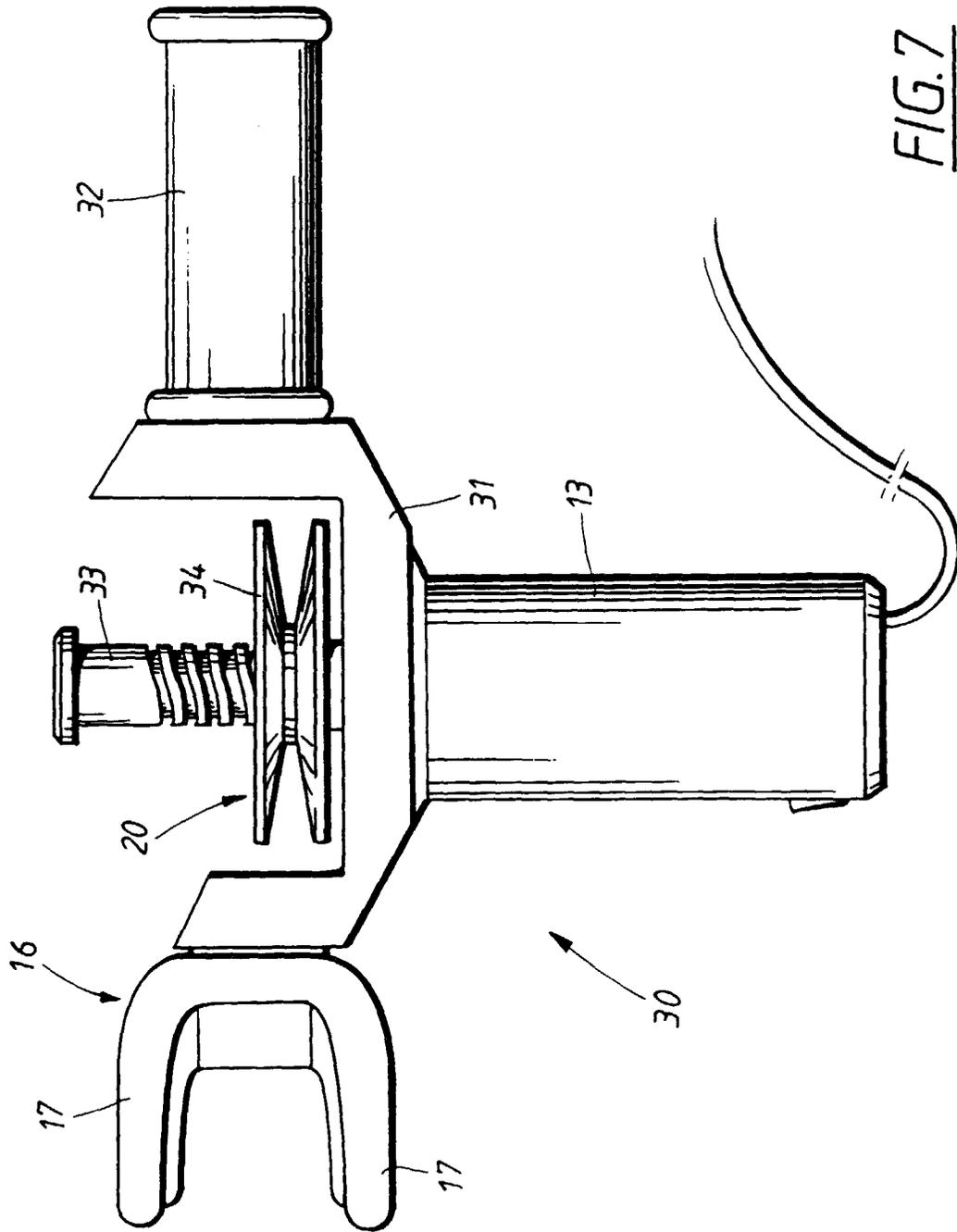


FIG. 7