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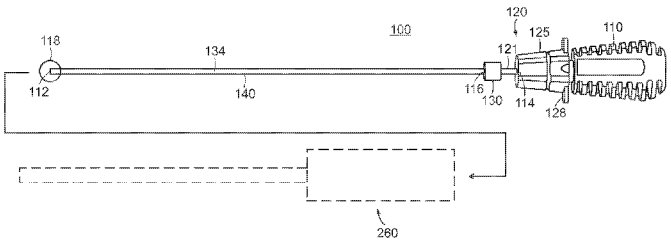

FIG. 1A

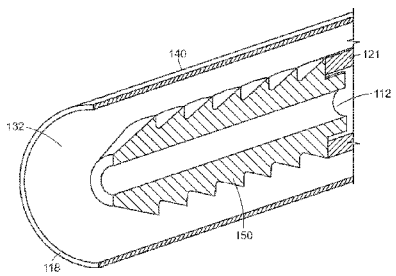

FIG. 1B

(57) Abstract: An anchor insertion device having a protective tube is provided. In one aspect, anchor insertion device includes an inserter including a shaft and an inserter stop formed at a proximal end of the shaft, a protective tube having an inner diameter sized to receive the shaft of the inserter and cover an anchor coupled to a distal end of the shaft, the protective tube further including a proximal end, a distal end, and a cylindrical surface extending between the proximal end and distal end of the protective tube; and a stop formed circumferentially on the cylindrical surface of the protective tube at the proximal end of the protective tube, the stop being adapted to engage with the inserter stop.

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ANCHOR INSERTION DEVICE HAVING PROTECTIVE TUBE

FIELD

This present disclosure relates to an anchor insertion device, and more particularly, to an anchor insertion device having a protective tube.

BACKGROUND

Surgeons use a variety of suture anchors to conduct soft tissue repair procedures. For these procedures, one or more sutures called “repair” sutures are attached to a suture anchor, which is or will be fixed to bone. The repair sutures are used to tie soft tissue down to the bone. There are many challenges to joining a repair suture to a suture anchor.

A typical soft tissue anchor insertion device includes an anchor placed at the distal end of the insertion device. The insertion device is then fed through a cannulated guide which aligns the anchor to a pre-drilled bone hole. Varying mating geometries have been experimented with in an attempt to stabilize the anchor on the insertion device. However, as device sizes continue to become smaller, less material is available at the working end of the insertion device for mating with the anchor. An anchor at the distal end becomes unstable due to a small amount of surface area contact while being exposed to various forces during surgery. As a result, the anchor disposed at the distal end of the insertion device is at risk for falling off the insertion device, or becoming damaged, especially when the insertion device is inserted into the cannulated guide and through the bone tunnel.

SUMMARY

Accordingly, there is a need to develop a new insertion device to prevent anchors from being accidentally disconnected from the insertion device or mangled during a surgical procedure.

Described herein are examples of an anchor insertion device which includes a protective sleeve that maintains axial alignment of an anchor coupled to a distal end of the insertion device. The sleeve may set slightly recessed within a counterbore of the bone tunnel in order to provide further anchor alignment and

stability with the bone tunnel. Advantageously, the sleeve protects the anchor from exposure outside of a cannulated guide, and up until it is adjacent to a bone hole.

In one aspect of the present disclosure, the anchor insertion device may have a shaft with and an inserter stop formed at a proximal end of the shaft, a protective tube having an inner diameter sized to slide over the shaft of the inserter and over an anchor coupled to a distal end of the shaft, the protective tube further having a proximal end and a distal end, an outer surface extending between the proximal end and distal end, the outer surface completely covering the anchor, and a stop formed circumferentially on the outer surface at the proximal end of the protective tube, the stop being adapted to engage the inserter stop when the anchor is exposed beyond the distal end of the protective tube. The outer surface of the protective tube can extend along an axial direction of the inserter parallel to a longitudinal direction of the anchor, and the protective tube is slidable along the axial direction. A length of the protective tube may be greater than a length of the anchor. The inserter further may have a handle coupled to the proximal end of the shaft. When the anchor is in an exposed position, the stop is in contact with the inserter stop. When the anchor is in a contained position, the stop can be separated from the inserter stop by a distance greater than a length of the anchor. A diameter of the stop may be greater than a diameter of the outer surface of the protective tube.

In one aspect of the present disclosure, the anchor insertion device may have an inserter with a shaft and an inserter stop formed at a distal end of the shaft, a protective tube having an inner surface sized to slide over an anchor coupled to a distal end of the shaft of the inserter, the protective tube further having a proximal end, a distal end, and an outer surface extending between the proximal end and the distal end, the outer surface completely covering the anchor, and a stop circumferentially formed on the inner surface at the proximal end of the protective tube, the stop defining an annulus through which a portion of the shaft slides, the stop being adapted to engage the inserter stop when the anchor is contained within the protective tube. The outer surface of the protective tube may extend along an axial direction of the inserter parallel to a longitudinal direction of the anchor, the protective tube being slidable along the axial direction. The

inserter can further include a handle coupled to a proximal end of the shaft. A length of the protective tube may be greater than a length of the anchor. The inserter stop can include a distal end with a profile configured to mate with a profile of the proximal end. An annulus defined by the stop may have an inner diameter less than an outer diameter of the annulus defined by the inserter stop. The anchor may be in a contained position when the stop contacts the inserter stop, and the anchor is in an exposed position when the stop is separated from the inserter stop by a predetermined distance, the predetermined distance being greater than a length of the anchor. The stop may have an inner diameter greater than a diameter of the outer surface of the shaft and the inserter stop has an outer diameter greater than the inner diameter of the stop. The device can further include a cannulated guide where the anchor insertion device is disposed therein. The cannulated guide may have teeth at a distal end. The device further may further include a suture securely coupled to the anchor.

In another aspect, the present disclosure provides a method of inserting a suture anchor into bone, which may include inserting an anchor insertion device into a bone hole, the anchor insertion device including an inserter having a shaft, and a protective tube having an inner surface sized to slide over an anchor coupled to a distal end of the shaft; retracting the protective tube to expose the anchor; and disengaging the anchor from the shaft so that it remains in the bone hole. An outer surface of the protective tube may extend along an axial direction of the inserter parallel to a longitudinal direction of the anchor and the protective tube is slidable along the axial direction.

Advantageously, the protective tube prevents the anchor from being accidentally disconnected from the insertion device or mangled during a surgical procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of the specification, illustrate examples of the present disclosure and together with the written description serve to explain the principles, characteristics, and features of the disclosure. In the drawings:

FIG. 1A illustrates a side view of an anchor insertion device including a protective tube in a contained state in accordance with an example of the present disclosure;

FIG. 1B illustrates a cross-section view of the distal end of the anchor insertion device of FIG. 1A;

FIG. 2 illustrates a side view of an anchor insertion device including a protective tube in an exposed state in accordance with an example of the present disclosure;

FIG. 3 illustrates a side view of a distal end of the anchor insertion device as shown in FIG. 2, when the anchor is placed within a pre-drilled bone tunnel of a defined geometry;

FIGs. 4A-B illustrates side views of an anchor insertion device including a free-sliding protective tube, in accordance with an alternative example of the present disclosure;

FIGs. 5A-B illustrates sectional views of the anchor insertion device as shown in FIG. 4; and

FIG. 6 illustrates cross-section view of the anchor insertion device as shown in 5A.

DETAILED DESCRIPTION

In the following detailed description, reference is made to accompanying drawings, which form a part of the present disclosure. The particulars shown herein are by way of example and for purposes of illustrative discussion of the examples only and are presented in the case of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the disclosure. In this regard, no attempt is made to show structural details of the subject matter in more detail than is necessary for the fundamental understanding of the disclosure, the description taken with the drawings making apparent to those skilled in art how the several forms of the present disclosure can be embodied in practice. Further, like reference numbers and designations in the various drawings indicate like elements. Except where otherwise indicated, all numbers expressing quantities of ingredients, reaction

conditions, and so forth used in the specification and claims are to be understood as being modified in all instances by the term "about."

For the purposes of describing and defining the present teachings, it is noted that the term "substantially" is utilized herein to represent the inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. The term "substantially" is also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

Turning now to the figures, FIGs. 1A-3 illustrate a first example of an anchor insertion device 100 in accordance with an example of the present disclosure.

FIG. 1A illustrates a side view of the anchor insertion device 100 in a contained position. The anchor insertion device 100 is shown as including an inserter 120 which is made up of a shaft 121 coupled at its proximal end 114 to a handle 110. A protective tube 140 having a proximal end 116 and a distal end 118, and an outer surface 134 extending between the proximal end 116 and the distal end 118, is disposed over the shaft 121. The protective tube 140 covers substantially the entire length of the shaft 121. The diameter of the outer surface 134 of the protective tube 140 is selected to fit within a cannulated guide 260. The protective tube 140 may also have a length that is substantially the same as or longer than the length of the cannulated guide 260. The inserter 120 may further include an inserter stop 125, and an anchor release mechanism 128, the purpose of which will be described below. As further shown in FIG. 1A, a positive stop 130 is formed circumferentially on the outer surface 134 of the protective tube 140 at its proximal end 116. The outer diameter of the positive stop 130 can vary but is selected to be greater than the outer diameter of the cannulated guide 260.

As shown in FIG. 1B, when the protective tube 140 is in a contained position, the protective tube 140 completely covers an anchor 150 releasably coupled to the distal end 112 of the shaft 121 at the distal end 118 of the protective tube 140 (FIG. 1A). An inner diameter 132 of the protective tube 140 is selected to be slightly greater than the outer diameters of the both the shaft 121

and the anchor 150, thereby allowing protective tube 140 to slide over shaft 121 and anchor 150. In one example, protective tube 140 has an inner diameter 132 of about 2.3 mm, and the shaft 121 and anchor 150 each have an outer diameter of about 2.0 mm. Upon insertion of the distal end 118 of the protective tube 140 into a bone hole, the anchor release mechanism 128 (FIG. 1A) can be deployed to release the anchor 150 from the shaft 121.

FIG. 2 illustrates a side view of a portion of the anchor insertion device 100 in an exposed position. The anchor insertion device 100 is shown as inserted through a cannulated guide 260. The protective tube 140 is moved proximally over the shaft 121 until the positive stop 130 comes into contact with the inserter stop 125. Since, in a contained position, the positive stop 130 is separated from the inserter stop 125 by a distance that is selected to be approximately equal to or slightly greater than the length of the anchor (FIG. 1B), in the exposed position, the anchor becomes exposed at the distal end 118 of the protective tube 140, as shown in more detail in FIG. 3.

FIG. 3 illustrates a side view of the distal end 118 of the protective tube 140 with the protective tube 140 in an exposed position. As shown in FIG. 3, a bone 200 is pre-drilled to form a bone hole 210 and an optional countersunk portion 220 of the bone hole 210. An outer diameter of the protective tube 140 is selected to fit within the countersunk bone hole 220, and the countersunk bone hole 220 may be drilled to have a size that substantially receives the protective tube 140 but rejects the shaft diameter of the cannulated guide 260. The bone hole 210 may also be drilled to have a size that substantially receives the anchor 150 but rejects the protective tube 140. In this manner, the anchor 150 can be fully exposed and deployed in the bone 200, and well set into the bone hole 210, with the distal end 118 of the protective tube 140 flush with the proximal end of the bone hole 210. A distal end of cannulated guide 260 may also include teeth 261 formed thereon to increase friction between the bone 200 and the cannulated guide 260.

Taking together the referenced elements of FIGs. 1A-3, in one example of a method of use, before anchor deployment, the cannulated guide 260 may be inserted first into the bone 200 to guide the anchor insertion device 100 to the bone hole 210. A surgeon can then insert the anchor insertion device 100 into the cannulated guide 260 to bring the anchor 150 close to the bone hole 210, until the

positive stop 130 is in contact with the proximal end of the cannulated guide 260. Thereafter, the surgeon can tap the handle 110 of the insertion device 100 to force the anchor 150 into the bone hole 210. Since the positive stop 130 of the protective tube 140 is in contact with the cannulated guide 260, the protective tube 140 does not advance while the surgeon taps the handle 110 to advance the anchor 150 into the bone hole 210. Alternatively, the protective tube 140 can be positioned against the countersunk bone hole 220 or a bone surface around the bone hole 210 in order to provide further alignment and stability of the anchor 150 with the bone tunnel 210. The protective tube 140 can then be gradually moved from the contained position to the exposed position in response to the tapping force exerted on the handle 110 and transferred to the shaft 121. Subsequently, the surgeon can deploy the anchor release mechanism 128 to release the anchor 150 from the shaft 121. Alternatively, the protective tube 140 can be assembled over the anchor insertion device 100 prior to insertion through the guide 260, therefor protecting the anchor 150 during insertion through the guide 260 and into the bone tunnel 210.

FIGs. 4A-6 illustrate another example of an anchor insertion device 300, in accordance with an example of the present disclosure. Anchor insertion device 300 is substantially the same as anchor insertion device 100 as shown in FIGs. 1A-3B, except as described below.

Referring now to FIG. 4A, an anchor insertion device 300 is shown as including an anchor 350 (FIG. 4B) covered by a protective tube 340 in a contained position. FIG. 4B shows the same anchor 350 uncovered by the protective tube 340 in an exposed position. FIGs. 5A and 5B show the same examples as FIGs. 4A and 4B, respectively, in cross-section. In these examples, the anchor 350 includes a central cannula 352 to allow a repair suture (shown in FIG. 6) to pass therethrough. An inserter 320 includes a shaft 321 and an inserter stop 325 formed adjacent to the distal end 312 of shaft 321. In one example, the inserter stop 325 is formed on the shaft 321 at a location of about 2 mm distant from the distal terminus of the shaft 321 and has an outer diameter of about 2.35 mm. The inserter stop 325 may be a protrusion from an outer surface of the shaft 321 and configured to have an outer circumference profile that substantially matches an inner surface profile of the protective tube 340. Likewise, the protective tube 340

includes a tube stop 345 at a proximate end 316 thereof. The tube stop 345 is configured to have an inner circumference profile that substantially matches the outer surface profile of the shaft 321. The inner diameter of the tube stop 345 is designed to slide freely over the outer diameter of the shaft 321, but also circumferentially overlap the inserter stop 325, such that the protective tube 340 does not fall off of the inserter 320.

It is appreciated that the circumference profile matching between the inserter stop 325 and the protective tube 340, and between the tube stop 345 and the shaft 321, allows the protective tube 340 to slide on the shaft 321 along an axial direction without substantial lateral movement. In one example, the circumference profile matching causes the protective tube 340 to be frictionally engaged with the shaft 321, such that only a tapping force exerted on the handle (not shown) that overcomes the static friction between the protective tube 340 and the shaft 321 can drive the anchor 350 into a bone hole.

As shown in FIG. 5B, a distal end 324 of the inserter stop 325 has a curved profile, which may be a concaved curve surrounding the longitudinal axis of the shaft 321, while a proximal end 326 of the inserter stop 325 has a step profile that matches with that of the tube stop 345. The curved profile of the inserter stop 325 ensures that the protective tube 340 can smoothly slide on the shaft 321. The proximal end 326 of the inserter stop 325 may also have a curved surface which optionally mates with a similar geometry on the protective tube 340.

In FIGs. 5A-B, it can be seen that the length of the protective tube 340 is selected to be slightly greater than that of the anchor 350. For example, the protective tube 340 may have a length from about 8 cm to about 16 cm, and the anchor 350 may have a length from about 6 cm to about 14 cm. Accordingly, when the tube stop 345 is engaged and in contact with the inserter stop 325, the protective tube 340 is in its contained state that completely covers the anchor 350.

FIG. 6 illustrates the anchor 300 of FIG. 5B in cross-section, with the protective tube 340 shown in a contained position. The anchor insertion device 300 may include one or more sutures 270 passing through the central cannulation 352 of shaft 321. One end of the repair sutures 270 can be securely attached to the anchor 350 by way of a suture knot 280 or suture eyelet (not shown), or otherwise, while the other end of the repair sutures 270 can be released after the

anchor 350 is deployed. As shown in FIG. 6, the tube stop 345 defines an annulus 336 through which a portion of the shaft 321 slides. The annulus 336 of the tube stop 345 has an inner diameter less than an outer diameter of an annulus 338 defined by the inserter stop 325.

Taking together the referenced elements of FIGs. 3-6, in an example of a method of use, before anchor deployment, a surgeon can insert the anchor insertion device 300 with the anchor 350 into the cannulated guide 260 to bring the anchor 350 close to the bone hole 210. When the anchor 350 is hammered into the bone hole 210, a distal terminus of the protective tube 340 contacts the countersunk bone hole 220 or a bone surface around the bone hole 210, and the protective tube 340 slides from its contained position to its exposed position as reacting to the hammering force. The anchor 350 is then moved out of the protective tube 340. In this example, the protective tube 340 only covers the distal end of the inserter 320 and does not extend to the proximal end of the inserter 320. The protective tube 340 can be a free-sliding tube that is constrained to a certain longitudinal range (e.g., length of anchor 350) of motion on the inserter 320. The suture anchor 350 is therefore completely protected from pre-guide insertion situations up until it is adjacent with the bone hole 210. The protective tube 340 can alternatively sit within a countersink bone hole 220. Advantageously, this results in smooth anchor transition from inserter 320 to bone hole 210, and prevents additional exposure to off-axis forces. It is also contemplated by this disclosure that there may be another set of stepped-out diameter positive stops on the shaft 321 limiting the proximal travel distance of the protective tube 340 over the shaft 321.

Since the protective tube 340 described above makes a secure fit around both the shaft 321 and the anchor 350 of the anchor insertion device 300, there is minimal radial clearance between the anchor 350 and an inside surface of the protective tube 340, which may be about 0.254 mm. Advantageously, therefore, there is little room for lateral movement of the anchor 350 within the protective tube 340 and a reduced chance of the anchor 350 being mangled or accidentally decoupled from the shaft 334 during insertion into bone 220. Therefore, the anchor insertion device 300 of the present disclosure advantageously results in a

higher likelihood for proper anchor insertion and provides a more robust and secure inserter system.

It is appreciated that, in alternative examples, various sleeve configurations, geometries, and retraction methods may be used to achieve the same or similar results of the present disclosure. It is also appreciated that the anchor insertion device of the present disclosure may properly work with anchors of different sizes and expandable to curved insertion systems (e.g., curved or flexible shaft).

Although the present disclosure has been described with respect to various examples, it would be apparent to one of ordinary skill in the art that various other examples are possible, without departing from the spirit and scope as defined in the appended claims.

CLAIMS

1. An anchor insertion device (100) comprising:

an inserter (120) having a shaft (121) and an inserter stop (125) formed at a proximal end (116) of the shaft (121);

a protective tube (140) having an inner diameter (132) sized to slide over the shaft (121) of the inserter (120) and over an anchor (150) coupled to a distal end (112) of the shaft (120), the protective tube (140) further having a proximal end (116) and a distal end (118), and an outer surface (134) extending between the proximal end (116) and distal end (118), the outer surface (134) completely covering the anchor (150); and

a stop (130) formed circumferentially on the outer surface (134) at the proximal end (116) of the protective tube (140), the stop (130) being adapted to engage the inserter stop (125) when the anchor (150) is exposed beyond the distal end (118) of the protective tube (140).

2. The device of claim 1, wherein the outer surface (134) of the protective tube (140) extends along an axial direction of the inserter (120) parallel to a longitudinal direction of the anchor (150), and wherein the protective tube (140) is slidable along the axial direction.

3. The device of claim 1, wherein a length of the protective tube (140) is greater than a length of the anchor (150).

4. The device of claim 1, wherein the inserter (120) further comprises a handle (110) coupled to the proximal end (116) of the shaft (120).

5. The device of claim 1, wherein, when the anchor (150) is in an exposed position, the stop (130) is in contact with the inserter stop (125), and wherein, when the anchor (150) is in a contained position, the stop (130) is separated from the inserter stop (125) by a distance greater than a length of the anchor (150).

6. The device of claim 1, wherein a diameter of the stop (130) is greater than a diameter of the outer surface (134) of the protective tube (140).

7. An anchor insertion device (300), comprising:

an inserter (320) having a shaft (321) and an inserter stop (325) formed at a distal end (312) of the shaft (321);

a protective tube (340) having an inner surface (332) sized to slide over an anchor (350) coupled to a distal end (312) of the shaft (321) of the inserter (320), the protective tube (340) further having a proximal end (316), a distal end (318), and an outer surface (334) extending between the proximal end (316) and the distal end (318), the outer surface (334) completely covering the anchor (350); and

a stop (345) circumferentially formed on the inner surface (332) at the proximal end (316) of the protective tube (340), the stop (345) defining an annulus (336) through which a portion of the shaft (321) slides, the stop (345) being adapted to engage the inserter stop (325) when the anchor (350) is contained within the protective tube (340).

8. The device of claim 7, wherein the outer surface (334) of the protective tube (340) extends along an axial direction of the inserter (320) parallel to a longitudinal direction of the anchor (350) and wherein the protective tube 340 is slidable along the axial direction.

9. The device of claim 7, wherein the inserter (320) further comprises a handle (310) coupled to a proximal end (316) of the shaft (321).

10. The device of claim 7, wherein a length of the protective tube (340) is greater than a length of the anchor (350).

11. The device of claim 7, wherein the inserter stop (325) includes a distal end (324) with a profile configured to mate with a profile of the proximal end (326).

12. The device of claim 7, wherein an annulus (336) defined by the stop (345) has an inner diameter less than an outer diameter of the annulus (338) defined by the inserter stop (325).

13. The device of claim 7, wherein the anchor (350) is in a contained position when the stop (345) contacts the inserter stop (325), and wherein the anchor (350) is in an exposed position when the stop (345) is separated from the inserter stop (325) by a predetermined distance.

14. The device of claim 13, wherein the predetermined distance is greater than a length of the anchor (150).

15. The device of claim 7, wherein the stop (345) has an inner diameter greater than a diameter of the outer surface (334) of the shaft (321), and wherein the inserter stop (325) has an outer diameter greater than the inner diameter of the stop (345).

16. The device of claim 7, further comprising a cannulated guide (260) where the anchor insertion device (300) is disposed therein.

17. The device of claim 16, wherein the cannulated guide (260) comprises teeth (261) at a distal end of the cannulated guide (260).

18. The device of claim 7, further comprising a suture (270) securely coupled to the anchor (350).

19. A method of inserting a suture anchor into bone, comprising:

inserting an anchor insertion device (100 or 300) into a bone hole (210), the anchor insertion device (100 or 300) comprising an inserter (120 or 320) having a shaft (121 or 321), and a protective tube (140 or 340) having an inner surface

(132 or 332) sized to slide over an anchor (150 or 350) coupled to a distal end (112 or 312) of the shaft (121 or 321);

retracting protective tube (140 or 340) to expose the anchor (150 or 350); and

disengaging the anchor (150 or 350) from the shaft (121 or 321) so that it remains in the bone hole (210).

20. The method of claim 19, wherein an outer surface (134 or 334) of the protective tube (140 or 340) extends along an axial direction of the inserter (120 or 320) parallel to a longitudinal direction of the anchor (150 or 350) and wherein the protective tube (140 or 340) is slidable along the axial direction.

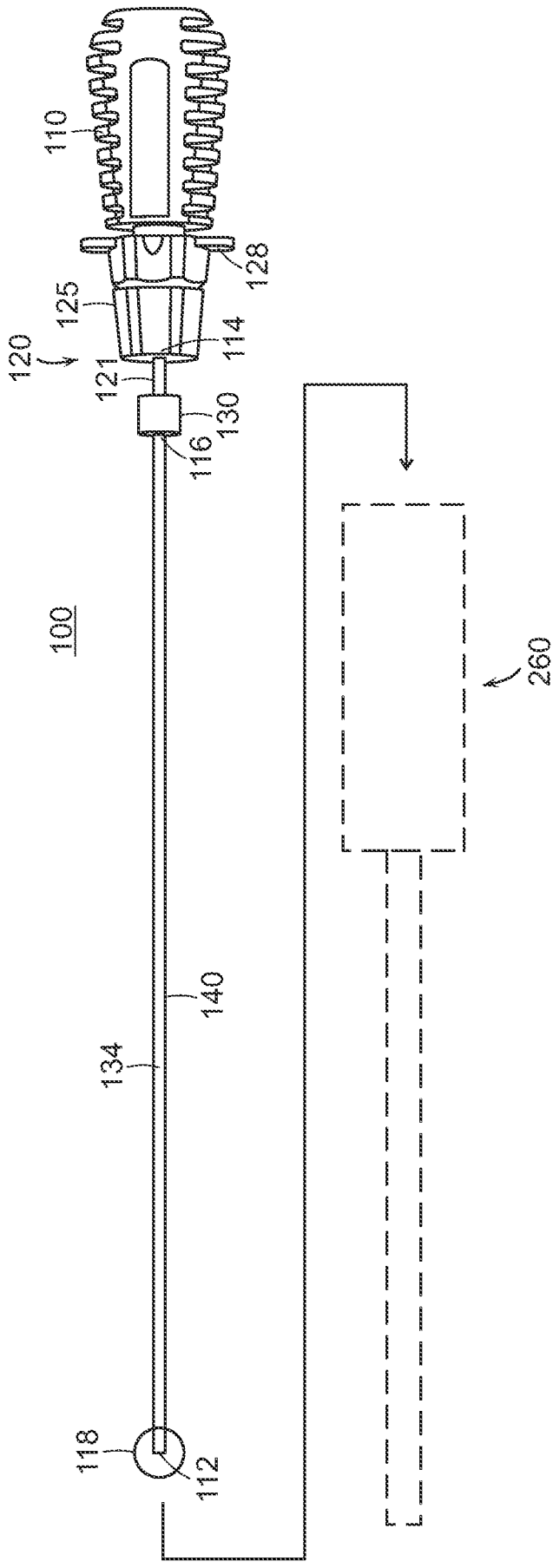
110
128
125
120
114
121
130
116
100
260
140
134
118
112

FIG. 1A

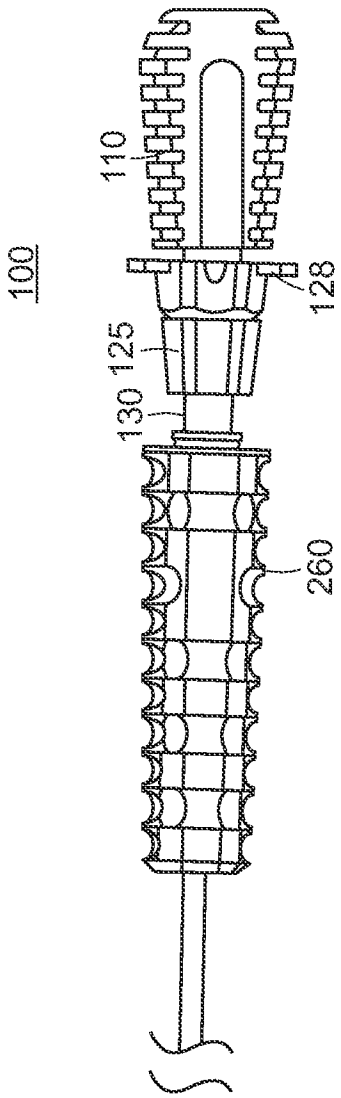
100
110
128
125
130
260

FIG. 2

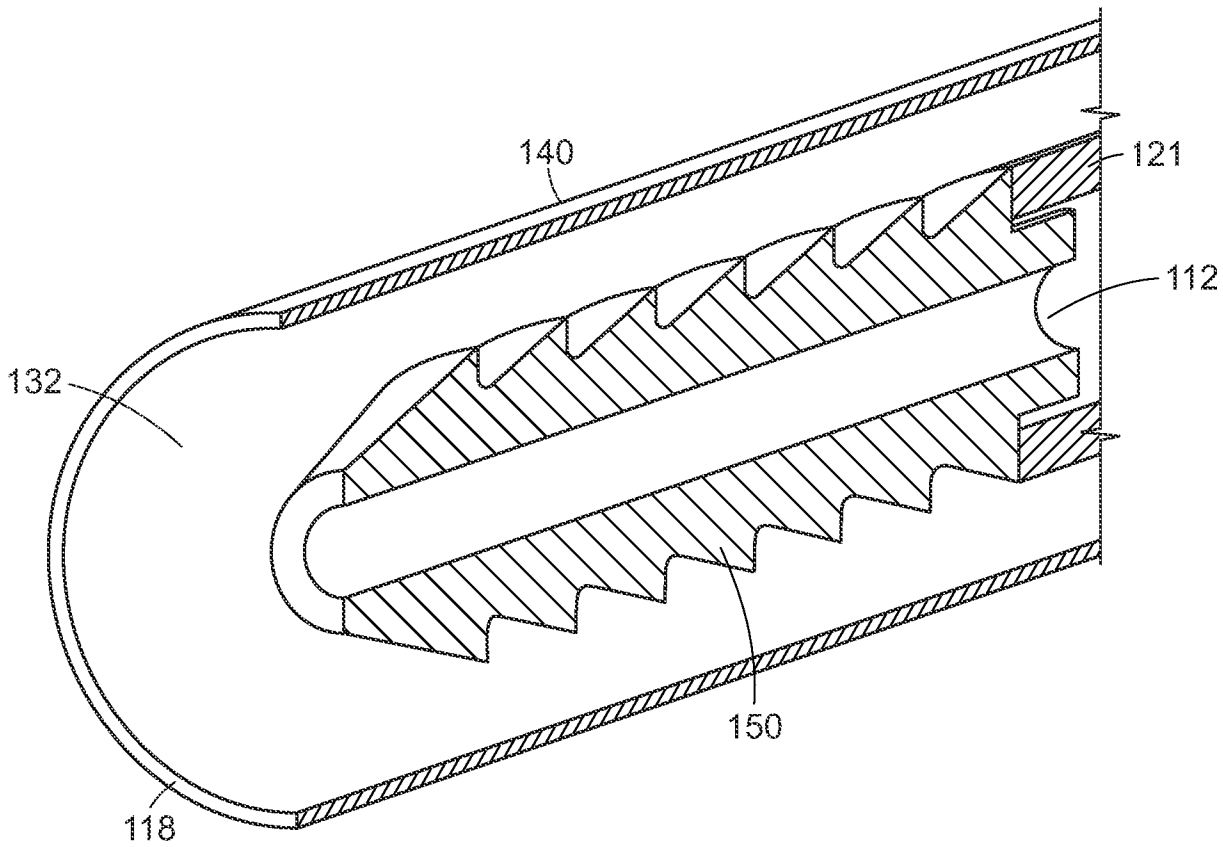

FIG. 1B

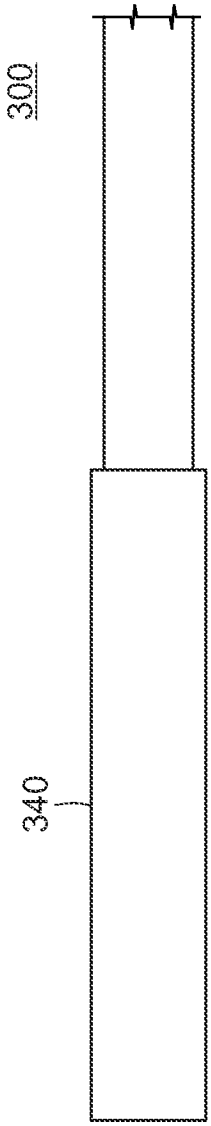

FIG. 4A

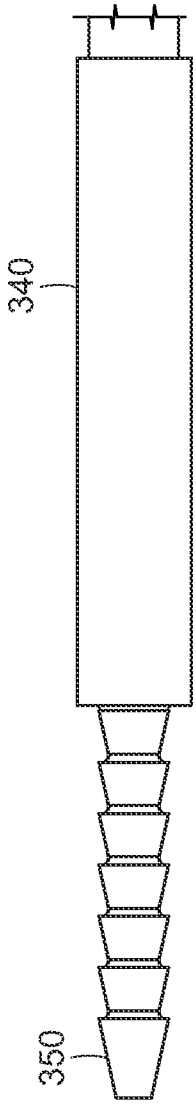

FIG. 4B

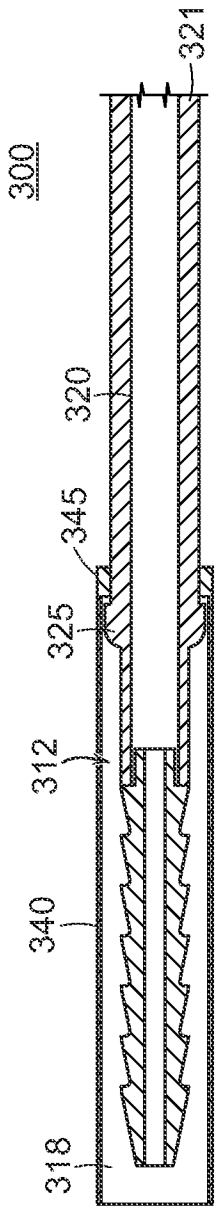

FIG. 5A

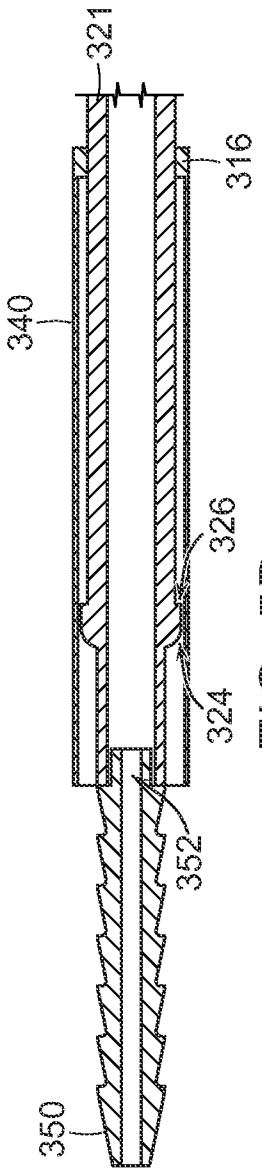

FIG. 5B

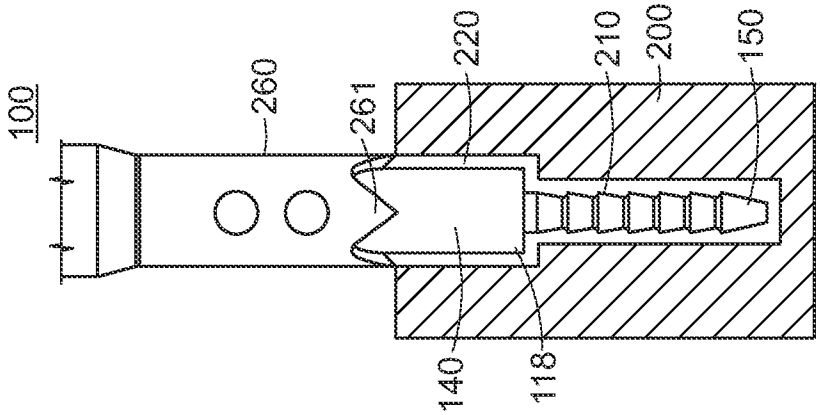

FIG. 3

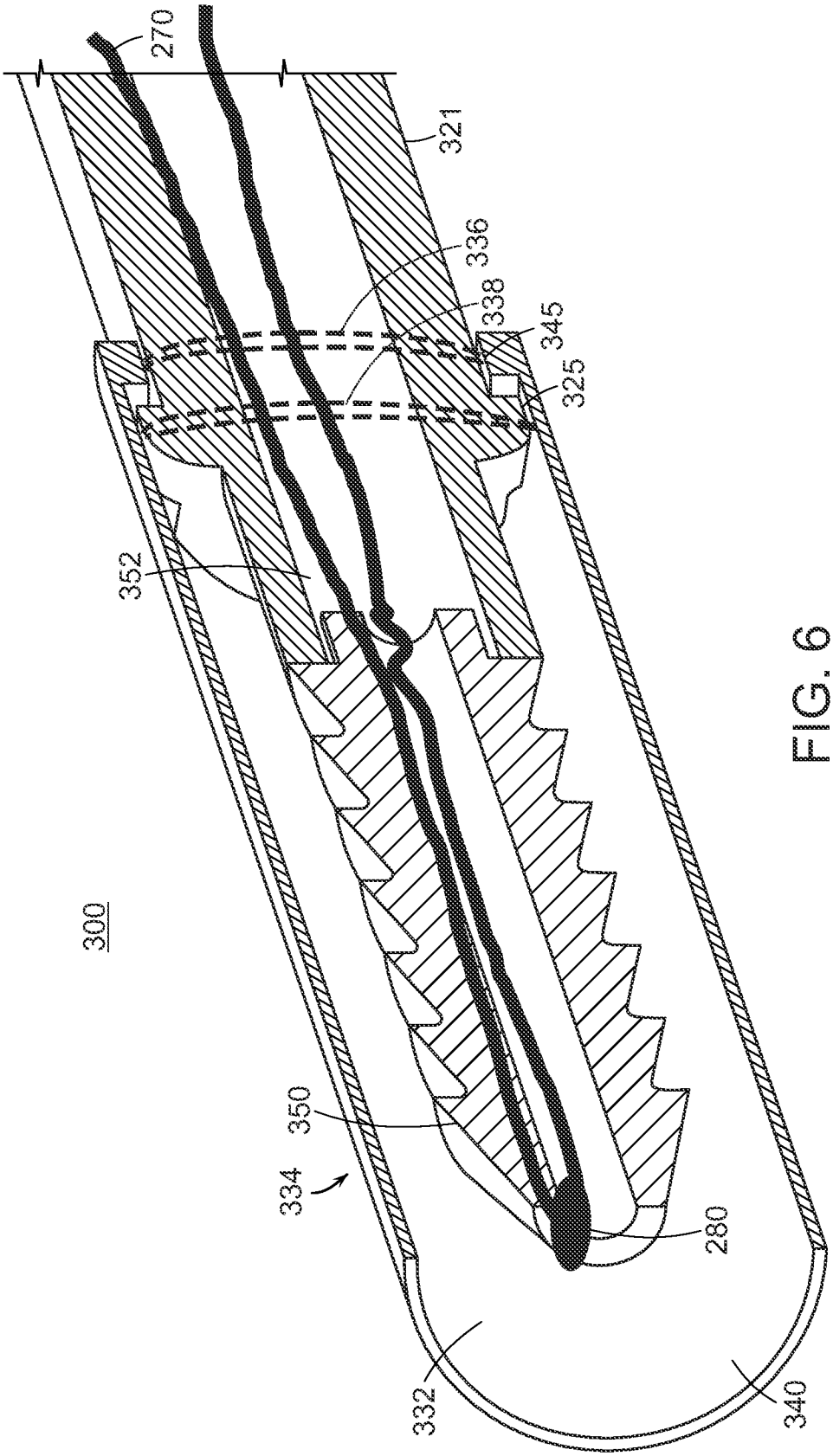

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/040695

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/151891 A1 (GLENN MELVIN L [US] ET AL) 17 October 2002 (2002-10-17) paragraph [0043] - paragraph [0046] paragraph [0050] - paragraph [0059]; figures 1-4B,6A-8	1-6
X	WO 90/09149 A1 (MITEK SURGICAL PROD [US]) 23 August 1990 (1990-08-23) page 3, paragraph 2 - page 6, paragraph 1; figures 1-11	1-6
X	US 2014/018853 A1 (BONUTTI PETER M [US]) 16 January 2014 (2014-01-16) paragraph [0034] - paragraph [0037]; figures 1,2,5	1-6

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 November 2015	25/01/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Roudaut, Tanguy

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/040695

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/188301 A1 (DALLARA MARK DOUGLAS [US] ET AL) 12 December 2002 (2002-12-12) paragraph [0031] - paragraph [0034]; figures 3,4a,5a	1-6
A	US 2003/135239 A1 (GABRIEL STEFAN [US] ET AL) 17 July 2003 (2003-07-17) paragraph [0029] - paragraph [0042]; figures 1,2A,9A,9B	1-6

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/040695

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [X] Claims Nos.: 19, 20
because they relate to subject matter not required to be searched by this Authority, namely:

see FURTHER INFORMATION sheet PCT/ISA/210

2. [ ] Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. [ ] Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [X] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-6

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2015/040695

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002151891 A1	17-10-2002	US 2002151891 A1	17-10-2002
		WO 02083007 A1	24-10-2002
WO 9009149 A1	23-08-1990	AT 116126 T	15-01-1995
		AU 640913 B2	09-09-1993
		CA 2026882 A1	09-08-1990
		DE 69015534 D1	09-02-1995
		DE 69015534 T2	13-07-1995
		EP 0419597 A1	03-04-1991
		JP 3043062 B2	22-05-2000
		JP H03504816 A	24-10-1991
		US 4968315 A	06-11-1990
		WO 9009149 A1	23-08-1990
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		US 6572635 B1	03-06-2003
		US 2003195565 A1	16-10-2003
		US 2006015108 A1	19-01-2006
		US 2014018852 A1	16-01-2014
		US 2014018853 A1	16-01-2014
US 2002188301 A1	12-12-2002	NONE	
US 2003135239 A1	17-07-2003	US 2003135239 A1	17-07-2003
		WO 03061530 A1	31-07-2003

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6

An anchor insertion device comprising: an inserter having a shaft and an inserter stop ;a protective tube having an inner diameter sized to slide over an anchor coupled to a distal end of the shaft, the protective tube further having a proximal end, a distal end, and an outer surface extending between the proximal end and the distal end, the outer surface completely covering the anchor; and a stop formed circumferentially at the proximal end of the protective tube, the stop being adapted to engage the inserter stop; wherein the inserter stop is formed at a proximal end of the shaft, the protective tube stop is formed on the outer surface of the protective tube and the protective tube stop is adapted to engage the inserter stop when the anchor is exposed beyond the distal end of the protective tube solving the problem of providing a rest position of the protective tube such that the anchor is exposed beyond the distal end of the tube;

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2. claims: 7-18

An anchor insertion device comprising: an inserter having a shaft and an inserter stop ;a protective tube having a surface sized to slide over an anchor coupled to a distal end of the shaft, the protective tube further having a proximal end, a distal end, and an outer surface extending between the proximal end and the distal end, the outer surface completely covering the anchor; and a stop formed circumferentially at the proximal end of the protective tube, the stop being adapted to engage the inserter stop; wherein the inserter stop is formed at a distal end of the shaft, the protective tube stop is formed on the inner surface of the protective tube, the stop defines an annulus through which a portion of the shaft slides and the protective tube stop is adapted to engage the inserter stop when the anchor is contained within the protective tube; solving the problem of preventing the protective tube to fall of from the inserter.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 19, 20

Claims 19 and 20 relate to a method for treatment of the human or animal body by surgery, practised on the human or animal body, namely a method of inserting a suture anchor into a bone (Rule 39.1 (iv) PCT). Consequently, no opinion will be formulated with respect to the novelty, inventive step and industrial applicability of the subject-matter of these claims (Article 17(2)(a)(i) PCT).