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Published:

- with international search report (*Art. 21(3)*)
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (*Rule 48.2(h)*)

ANCHOR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a PCT International Patent Application claiming priority to United States Patent Application No. 61/081,438 filed on July 17, 2008, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

FIELD OF TECHNOLOGY

[0002] The present disclosure relates to the repair of soft tissue and, more importantly, an anchor for use in the repair.

RELATED ART

[0003] Arthroscopic procedures often require soft tissue to be reattached to bone. To achieve this, anchors are placed in the bone and sutures attached to the anchor are passed through the tissue to securely retain the tissue in place. When making a repair of soft tissue to bone, it is advantageous to have as large an area of contact between the bone and tissue as possible. Anchor points spaced from one another in rows result in a repair having a broader area of contact. A procedure, and devices for use in such procedure, that securely attaches tissue to bone using a plurality of attachment points over a large area of contact is needed.

SUMMARY

[0004] In one aspect, the present disclosure relates to an anchor. The anchor includes an outer member including a body having an inner cavity, wherein the inner cavity includes a proximal portion configured for receipt of a delivery device and a distal portion having area of increased diameter. The anchor also includes an inner member coupled to the outer member,

wherein the inner member includes a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole.

[0005] In an embodiment, the outer member includes threads on an outer surface of the outer member. In another embodiment, the outer member includes longitudinal grooves on an outer surface of the member, the grooves extending a partial length of the outer member. In yet another embodiment, the proximal portion of the inner member includes an opening configured for receipt of a delivery device. In a further embodiment, the outer member rotates relative the inner member. In yet a further embodiment, the proximal portion of the inner member has a smaller diameter than the distal portion of the inner member.

[0006] In another aspect, the present disclosure relates to a delivery device including an inner shaft having a proximal portion and a distal portion, a first handle coupled to the proximal portion of the inner shaft, an outer shaft slidably engaged with the inner shaft and including a proximal portion and a distal portion, and a second handle coupled to the proximal portion of the outer shaft.

[0007] In an embodiment, the delivery device further comprises an anchor including an outer member including a body having an inner cavity, the inner cavity including a proximal portion configured for receipt of the outer shaft of the delivery device and a distal portion having area of increased diameter, and an inner member coupled to the outer member, the inner member including a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole. In another embodiment, the proximal portion of the inner member includes an opening configured for receipt of the inner shaft of the delivery device.

[0008] In yet another aspect, the present disclosure relates to a method of tissue repair including inserting a first anchor into bone, the first anchor having a flexible member coupled thereto; passing the ends of the flexible member through the tissue; providing a second anchor comprising an outer member including a body having an inner cavity, the inner cavity including a proximal portion configured for receipt of the outer shaft of the delivery device and a distal portion having area of increased diameter, and an inner member coupled to the outer member, the inner member including a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole; passing the ends of the flexible member through the through hole of the of the second anchor; and advancing the second anchor into bone via both axial and rotary advancement.

[0009] Further areas of applicability of the present disclosure will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the disclosure, are intended for purposes of illustration only and are not intended to limit the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The accompanying drawings, which are incorporated in and form a part of the specification, illustrate the embodiments of the present disclosure and together with the written description serve to explain the principles, characteristics, and features of the disclosure. In the drawings:

[0011] Fig. 1 shows a perspective view of an anchor of the present disclosure.

[0012] Fig. 2 shows a cross-sectional view of the anchor shown in Fig. 1.

[0013] Fig. 3 shows a perspective view of the delivery device of the present disclosure.

[0014] Figs. 4A-4C show the anchor of Fig. 1 in use during arthroscopic tissue repair.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0015] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the disclosure, its application, or uses.

[0016] Figs. 1 and 2 show the anchor **10** of the present disclosure. The anchor **10** includes an outer member **11** having a body **11a** and an inner cavity **11b**. The body **10** includes threads **11c** on an outer surface **11d** of the body **11a**. In addition, longitudinal grooves **11e** are located on the outer surface **11d**. The grooves **11e** extend a partial length of the outer member **11** and intersect the threads **11c**. The purpose of the grooves **11e** will be further described below. The inner cavity **11b** includes a proximal portion **11f** and a distal portion **11g**. The proximal portion **11f** includes channels **11f'** that are configured for receipt of a delivery device, as will be further described below. The distal portion **11g** includes an area of increased diameter **11g'**, the purpose of which will be further described below.

[0017] The anchor **10** also includes an inner member **12** coupled to the outer member **11**. The inner member **12** includes a proximal portion **12a** and a distal portion **12b**. The proximal portion **12a** has a smaller diameter than the distal portion **12b** and is located within the inner cavity **11b**. A projection **12a'** is located on the proximal portion **12a** and is received within the area of increased diameter **11g'** when the proximal portion **12a** is located within the inner cavity **11b**, such that the outer member **11** is rotatable relative to the inner member **12**, as will be further described below. The proximal portion **12a** also includes an opening **12a''** that is configured for receipt of a delivery device, as will be further described below. The distal portion **12b** includes a transverse through hole **12b'**, for purposes to be described below.

[0018] Fig. 3 shows a delivery device **20** including an inner shaft **21** (**Fig. 2**), an outer shaft **22** (**Fig. 2**) slidably engaged with the inner shaft **21**, and first and second handles **23,24** coupled to the inner and outer shafts **21,22**, respectively. The inner shaft **21** includes a proximal portion (**not shown**) and a distal portion **21b**. The distal portion **21b** includes a prong **21b'** that is located within the opening **12a''** of the inner member **12** when the anchor **10** is coupled to the delivery device **20**. The outer shaft **22** also includes a proximal portion **22a** and a distal portion **22b**. The distal portion **22b** includes prongs **22c**, extending from the distal portion **22b** and as shown in Fig. 2, that are located within the channels **11f'** of the outer member **11** when the anchor **10** is coupled to the delivery device **20**. In addition, the distal portion **22b** includes a smaller diameter compared to the diameter of the rest of the shaft **22**. This smaller diameter substantially reduces the possibility of the shaft **22b** from being lodged within the bone during insertion of the anchor **10**.

[0019] Figs. 4A-4C show the anchor **10** in use during arthroscopic repair of the rotator cuff. Fig. 4A shows a first anchor **30** that has been inserted into the lateral aspect of a bone **40**, such as a humeral bone. The anchor **30**, which has a flexible member **50**, such as a suture, coupled thereto is inserted into the bone **40**, a soft tissue **60**, such as a rotator cuff tendon, is placed on the bone **40** to be located adjacent to the anchor **30**, and the ends of the flexible member **50** are placed through the soft tissue **60**.

[0020] Next at least one end **51** of the flexible member **50** is passed through the transverse through hole **12b'**, as shown in Figs. 4A & 4B. After the flexible member **50** is passed through the through hole, the anchor **10** is subsequently inserted into a previously drilled hole **41** in the medial aspect of the bone **40**, as shown in Fig. 4C, such that the flexible member **50** is housed within the transverse through hole **12b'** and the ends **51** extend out of the hole **41**.

The anchor **10** is advanced into the hole **41** in an axially-oriented manner by tapping on the first handle **23** until the grooves **11e** are located within the hole **41** and can no longer be viewed. The second handle **24** is then used to rotate the outer member **11** relative to the inner member **12** and advance the remaining portion of the anchor **10** into the hole **41** until the entire anchor **10** is located within the bone **40** or flush with the bone **40**. The delivery device **20** is subsequently disengaged from the anchor **10** and removed from the hole **41**.

[0021] The shafts **21,22** include a stainless steel material, but may be made from any other metal or non-metal material that is bio-compatible and strong enough to withstand the forces that are placed on the shafts **21,22** during surgery. The shafts **21,22** may be machined, die drawn and subsequently machined, or made by any other method known to one of skill in the art. The shafts **21,22** are coupled to the handles **23,24** via a press-fit procedure. However, other methods of coupling the handles **23,24** to the shafts **21,22** are also within the scope of this disclosure. The handles **21,22** are of a non-metal material, but may be made from a metal material, and both are made via an injection molding process. However, other methods of making are also within the scope of this disclosure.

[0022] The components of the anchor **10** are made from a bioabsorbable polymer material and via an injection molding process. In addition, for the purposes of this disclosure, other methods of coupling the inner and outer members **11,12** may be used.

[0023] As various modifications could be made to the exemplary embodiments, as described above with reference to the corresponding illustrations, without departing from the scope of the disclosure, it is intended that all matter contained in the foregoing description and shown in the accompanying drawings shall be interpreted as illustrative rather than limiting. Thus, the breadth and scope of the present disclosure should not be limited by any of the above-

described exemplary embodiments, but should be defined only in accordance with the following claims appended hereto and their equivalents.

CLAIMS

What is claimed is:

1. An anchor comprising:

an outer member including a body having an inner cavity, the inner cavity including a proximal portion configured for receipt of a delivery device and a distal portion having area of increased diameter; and

an inner member coupled to the outer member, the inner member including a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole.

2. The anchor of claim 1 wherein the outer member includes threads on an outer surface of the outer member.

3. The anchor of claim 2 wherein the outer member includes longitudinal grooves on an outer surface of the member, the grooves extending a partial length of the outer member.

4. The anchor of claim 1 wherein the proximal portion of the inner member includes an opening configured for receipt of a delivery device.

5. The anchor of claim 1 wherein the outer member rotates relative the inner member.

6. The anchor of claim 1 wherein the proximal portion of the inner member has a smaller diameter than the distal portion of the inner member.

7. A delivery device comprising:

an inner shaft including a proximal portion and a distal portion;

a first handle coupled to the proximal portion of the inner shaft;

an outer shaft slidably engaged with the inner shaft and including a proximal portion and a distal portion; and

a second handle coupled to the proximal portion of the outer shaft.

8. The delivery device of claim 7 further comprising an anchor comprising:

an outer member including a body having an inner cavity, the inner cavity including a proximal portion configured for receipt of the outer shaft of the delivery device and a distal portion having area of increased diameter; and

an inner member coupled to the outer member, the inner member including a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole.

9. The delivery device of claim 8 wherein the proximal portion of the inner member includes an opening configured for receipt of the inner shaft of the delivery device.

10. A method of tissue repair comprising:

inserting a first anchor into bone, the first anchor having a flexible member coupled thereto;
passing the ends of the flexible member through the tissue;

providing a second anchor comprising an outer member including a body having an inner cavity, the inner cavity including a proximal portion configured for receipt of the outer shaft of a delivery device and a distal portion having area of increased diameter, and an inner member coupled to the outer member, the inner member including a proximal portion having a projection configured for receipt in the area of increased diameter and a distal portion having a transverse through hole;

passing the ends of the flexible member through the through hole of the of the second anchor; and

advancing the second anchor into bone via both axial and rotary advancement.

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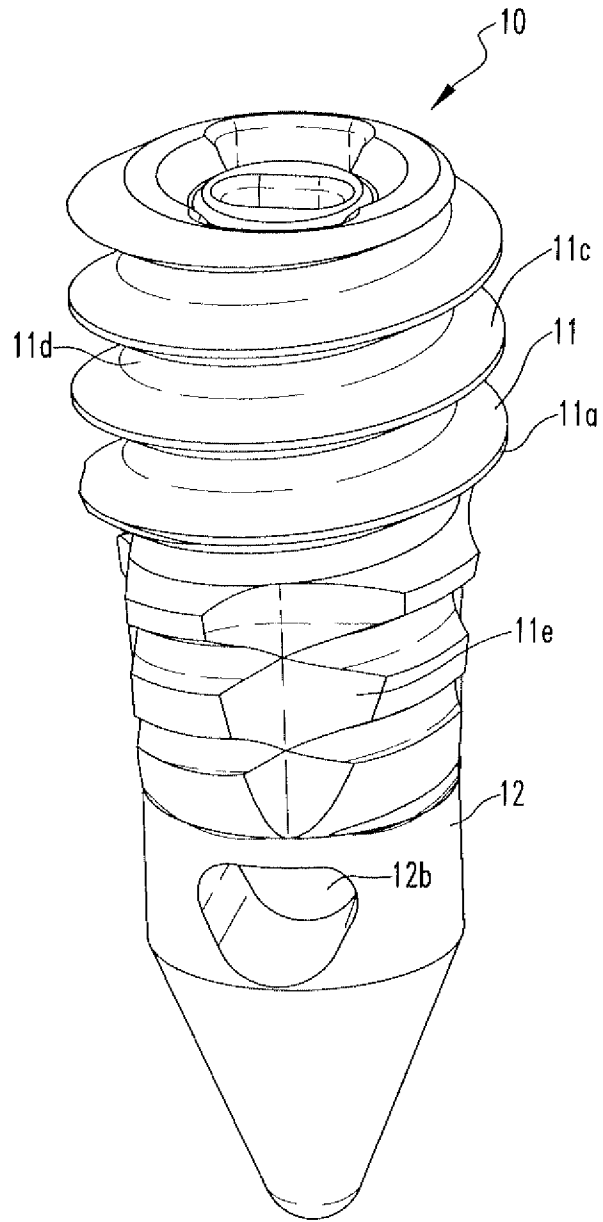


FIG.1

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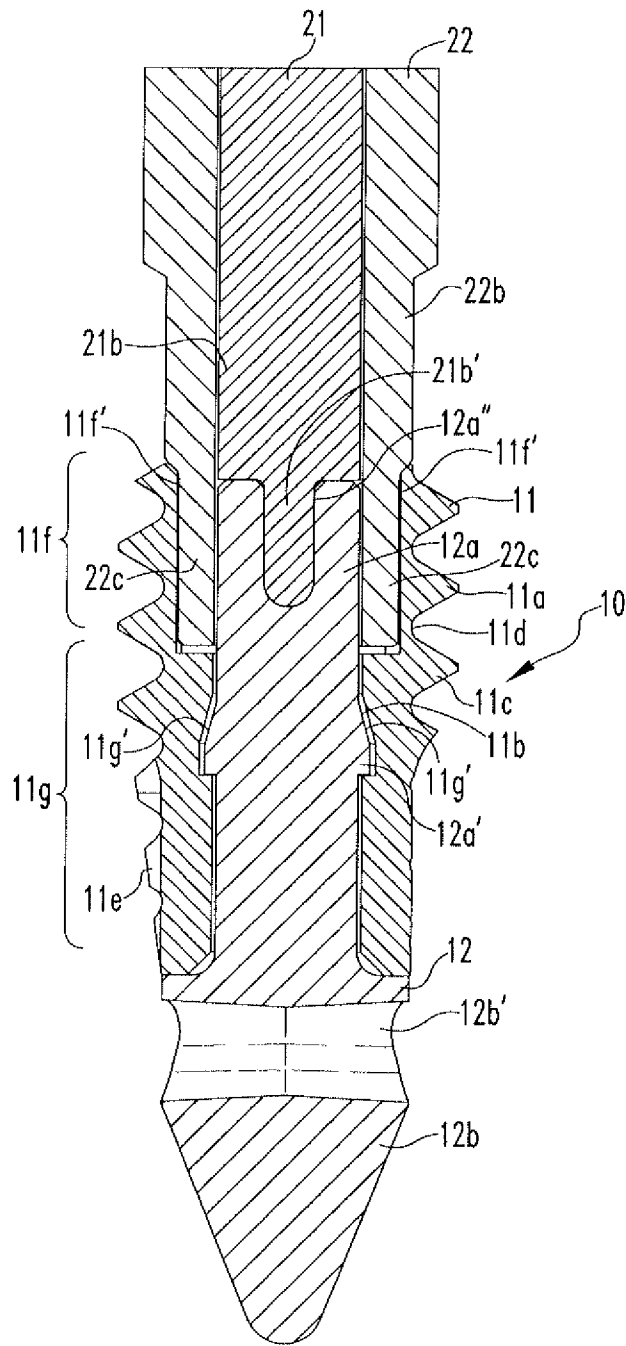


FIG. 2

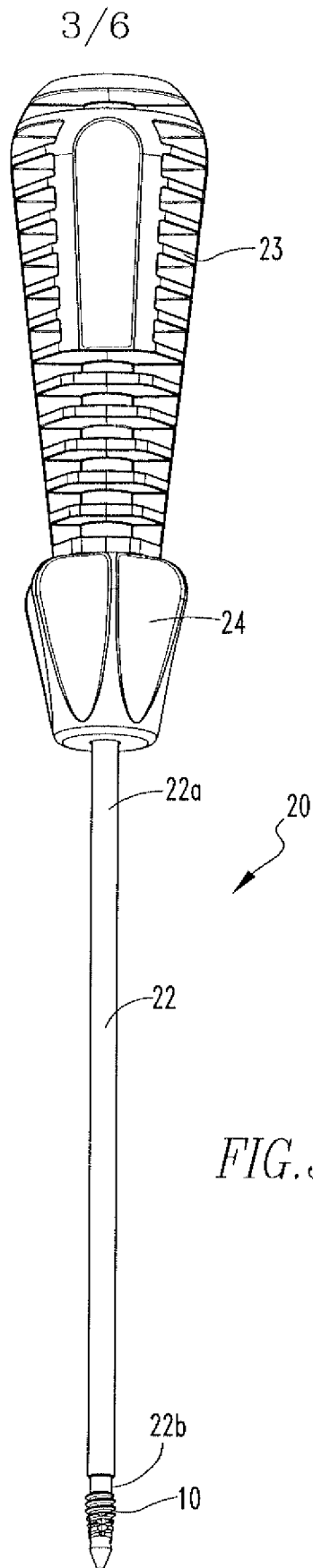


FIG. 3

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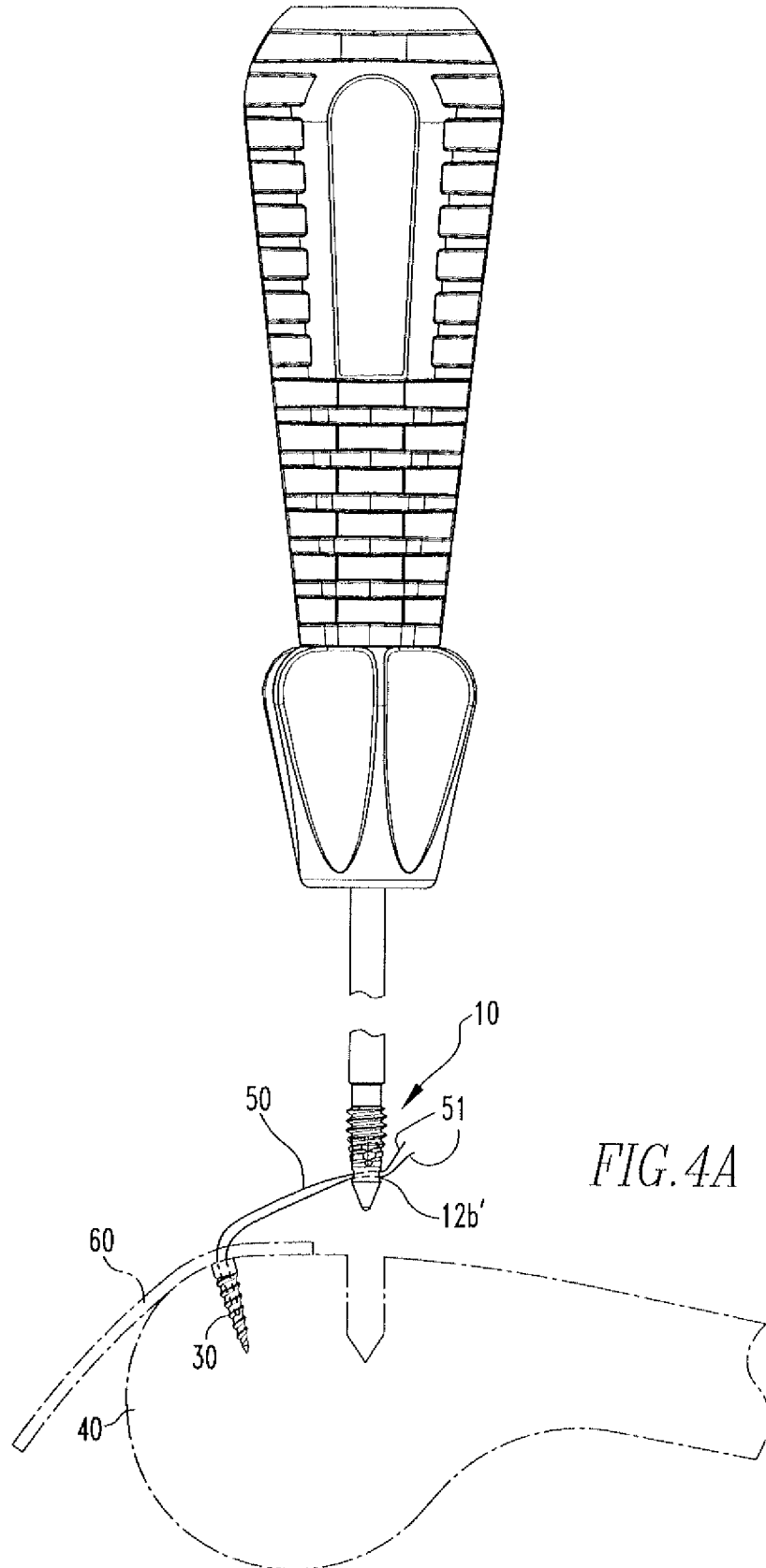
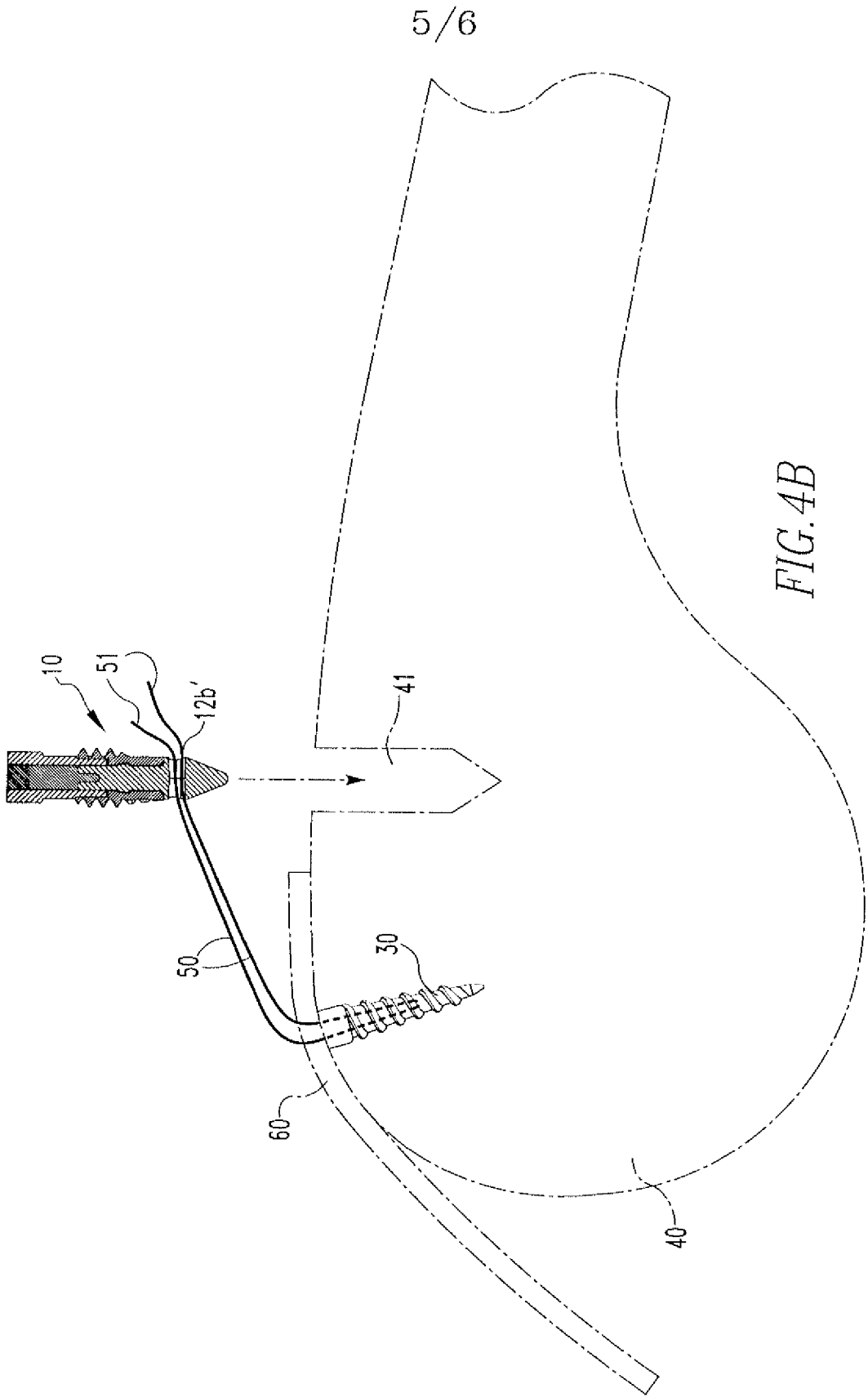


FIG. 4A



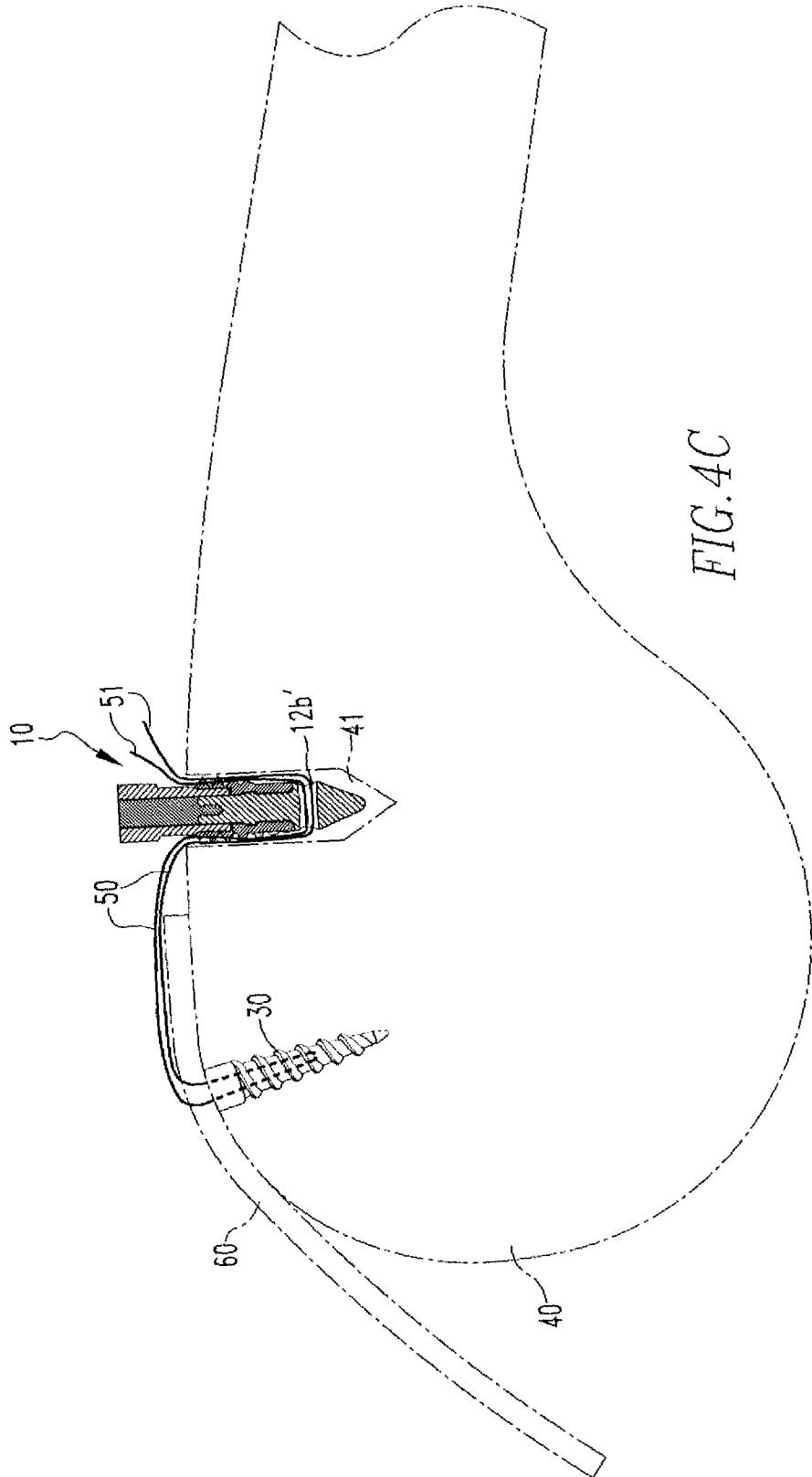


FIG. 4C

INTERNATIONAL SEARCH REPORT

International application No PCT/US2009/050670
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/04

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/21999 A (SURGICAL DYNAMICS INC [US]) 21 March 2002 (2002-03-21) page 7, paragraph 4 - page 8, paragraph 2; figures 1-4	1-3
Y	-----	4-6
X	US 5 472 452 A (TROTT ARTHUR F [US]) 5 December 1995 (1995-12-05) column 4, line 42 - column 6, line 28; figures 1-6 column 6, line 29 - column 7, line 15; figures 7-12	1
Y	-----	4,6
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Further documents are listed in the continuation of Box C.

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 document 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

6 October 2009

Date of mailing of the international search report

16/12/2009

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/050670

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 2007/219557 A1 (BOURQUE BERNARD J [US] ET AL) 20 September 2007 (2007-09-20) paragraph [0054] - paragraph [0057]; figures 4,5 figure 6A	1
Y	-----	5
X	US 2006/235413 A1 (DENHAM GREGORY J [US] ET AL) 19 October 2006 (2006-10-19) paragraph [0062] - paragraph [0063]; figures 1-3 figures 4A-4C -----	1,2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/050670

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. Claims Nos.: **10**
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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. 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.:

see annex

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.

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

Anchor with an outer member and an inner member

2. claims: 7-9

Delivery device with an inner shaft, a first handle, an outer shaft and a second handle.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2009/050670

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0221999	A	21-03-2002	AU 9267101 A 26-03-2002
			AU 2001292671 B2 15-06-2006
			AU 2006201965 A1 01-06-2006
			CA 2422283 A1 21-03-2002
			CA 2670661 A1 21-03-2002
			EP 1363541 A2 26-11-2003
US 5472452	A	05-12-1995	NONE
US 2007219557	A1	20-09-2007	AU 2007254027 A1 29-11-2007
			EP 1996085 A2 03-12-2008
			WO 2007136915 A2 29-11-2007
US 2006235413	A1	19-10-2006	NONE