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Published:

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— *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))*

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(54) Title: SCREW WITH VARIABLE DIAMETER CANNULATION AND DRIVER

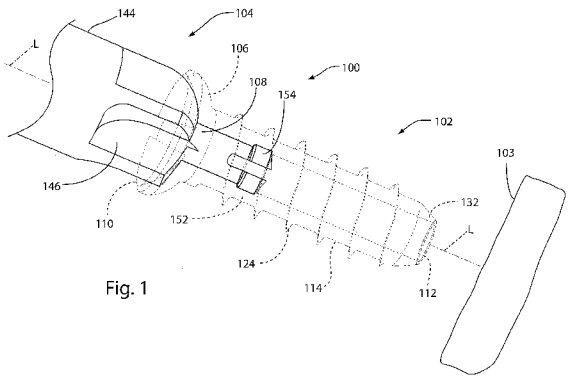

Fig. 1

(57) Abstract: A bone screw driving system (100) includes a screw (102) having a head (106) and a shaft (114) extending from the head. The screw includes a stepped opening (108) extending in the shaft that includes a first portion and a second portion having a greater cross-sectional dimension than the first portion. The bone screw driving system further includes a screw driver (104) having a driver shall that defines a tip (104) configured to engage the screw head. The driver further includes a pin (136) extending from the Up and sized to fit within the opening. The pin includes an abutment (154) movable to a locked configuration in the second portion of the opening, wherein the abutment defines a cross-sectional dimension greater than that of the first portion of the opening.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/023703

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/86 A61B17/88

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 Y	US 2006/025773 A1 (YEVMENENKO YAN [US] ET AL) 2 February 2006 (2006-02-02) figures 1,10a paragraphs [0044], [0059]	1-4,7, 9-11 5,6,8,20
X,P	US 2009/187194 A1 (HAMADA JAMES S [US]) 23 July 2009 (2009-07-23) figure 2 paragraph [0148]	1-4,9,10
Y,P	EP 2 140 824 A1 (BIEDERMANN MOTECH GMBH [DE]) 6 January 2010 (2010-01-06) figure 8	5,6
Y A	US 5 169 400 A (MUEHLING JOACHIM [DE] ET AL) 8 December 1992 (1992-12-08) figure 9	8 20

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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 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	Date of mailing of the international search report
6 May 2010	24/08/2010

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 90/08510 A1 (ACUFEX MICROSURGICAL INC [US]) 9 August 1990 (1990-08-09) figure 4	20

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

INTERNATIONAL SEARCH REPORT

International application No.
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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.:
because they relate to subject matter not required to be searched by this Authority, namely:

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.:

1-11, 20

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: 1-11, 20

Bone fixation screw with driver engaging slot and with threaded cannulated shaft having two cannulated portions with the distal one having a greater cross sectional dimension than the proximal one and kit comprising such a screw and a driver with a pin corresponding to the cannula dimensions.

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2. claims: 12-19

Screw driver with shaft defining a tip at its distal end which can fit in the head of a bone screw and pin extending from the tip with a length at least twice its cross-sectional dimension.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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