APPARATUS AND METHODS FOR BIOPSY AND ASPIRATION OF BONE MARROW

Apparatus and methods are provided to remove biopsy specimens from a bone and/or associated bone marrow using a powered drive and an intrasosseous (IO) needle set. The powered driver may rotate the IO needle set at an optimum speed to obtain a biopsy sample of bone and/or bone marrow. Apparatus and methods may also be provided for aspiration of bone marrow and/or stem cell transplant procedures. The apparatus may include a powered driver, a coupler assembly, a containment bag or sterile sleeve and various IO needles and IO needle sets with associated hubs and/or hub assemblies. Each IO needle set may include a cannula or catheter and an associated trocar stylet with respective tips operable to penetrate a bone and/or bone marrow with minimum trauma to a patient. Each hub assembly may be used to releasably dispose a respective stylet within an associated generally hollow cannula. Some coupler assemblies and/or hub assemblies may also be used with manual drivers.

Published: before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report: 17 July 2008
INTERNATIONAL SEARCH REPORT

International application No. PCT/US2007/078203

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61B 17/16 (2008.04)
USPC - 606/80
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)
IPC(8) - A61B 17/16 (2008.04)
USPC - 606/80

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)
PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 5,556,399 A (HUEBNER) 17 September 1996 (17 09 1996) entire document</td>
<td>1</td>
</tr>
<tr>
<td>Y</td>
<td>US 2006/0052790 A1 (MILLER) 09 March 2006 (09.03.2006) entire document</td>
<td>2-6, 9</td>
</tr>
<tr>
<td>Y</td>
<td>US 4,921,013 A (SPALINK et al) 01 May 1990 (01 05 1990) entire document</td>
<td>10-16</td>
</tr>
<tr>
<td>Y</td>
<td>US 5,333,790 A (CHRISTOPHER) 02 August 1994 (02 08 1994) entire document</td>
<td>12, 13</td>
</tr>
</tbody>
</table>

D Further documents are listed in the continuation of Box C.

* 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 18 April 2008
Date of mailing of the international search report 13 MAY 2008

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Form PCT/ISA/210 (second sheet) (April 2007)
INTERNATIONAL SEARCH REPORT

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

Group I, claims 1-21 and 23-25, drawn to an apparatus operable to insert an intraosseous device into a bone comprising a powered driver

Group II, claim 22, drawn to a hub assembly wherein a first end of a second hub having a threaded connection to engage with a threaded connection on the second end of a first hub

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 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

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

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2007)