Title: BIOABSORBABLE PLATES, FASTENERS, TOOLS AND METHOD OF USING SAME

Abstract: The present invention is a system for installing bioabsorbable plates for general bone repair, as for example, facial or cranial osteosynthesis. The present invention includes an improved plate (10) and fastener (12) system which reduces if not eliminates stresses within the plate (10). It also includes an improved fastener container and driver (24) for handling and installing fasteners (12). The system employs a unique water bath for heating the bioabsorbable plates (10) so they can be deformed to the contours of the bone being repaired. Additionally, there is a hand tool (140) for localized heating and deformation of the plate (10) when positioned against the bone to further ensure conformity with the bone structure. These and other features are contained within a kit (220) which is easily sterilized.
Published:
— with international search report

(88) Date of publication of the international search report:
21 February 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/05874

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7): A61B 17/80
US CL: 606/69
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)
U.S.: 606/69, 60

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)
EAST: bioabsorbable, absorbable, shape-memory, memory, plate

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>
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<tbody>
<tr>
<td>X</td>
<td>US 5,779,706 A (TSCHAKALOFF) 14 July 1998, Figs. 7A-C.</td>
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<td>X</td>
<td>US 5,290,281 A (TSCHAKALOFF) 01 March 1994, Figs. 7A-C.</td>
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<td>US 5,607,427 A (TSCHAKALOFF) 04 March 1997, Figs. 7A-C.</td>
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<td>A</td>
<td>US 5,944,721 A (HUEBNER) 31 August 1999, Fig. 3.</td>
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<td>A</td>
<td>US 5,968,046 A (CASTLEMAN) 19 October 1999, Fig. 1.</td>
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<td>A</td>
<td>US 3,695,259 A (YOST) 03 October 1972, Figs. 1-4.</td>
<td>1</td>
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</tbody>
</table>

Further documents are listed in the continuation of Box C. \[ \square \] See patent family annex.

Date of the actual completion of the international search  10 JULY 2001
Date of mailing of the international search report  24 AUG 2001

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Authorized officer
L. Gene Mancene

Telephone No. (703) 505-2696

Form PCT/ISA/210 (second sheet) (July 1998)
### DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<th>Relevant to claim No.</th>
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<td>A</td>
<td>US 3,534,731 A (MULLER) 20 October 1970, Figs. 1-5.</td>
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<td>A</td>
<td>US 4,512,038 A (ALEXANDER et al.) 23 April 1985, Figs. 1-4.</td>
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<td>A</td>
<td>US 4,905,080 A (TUNC) 06 March 1990, all.</td>
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</table>
INTERNATIONAL SEARCH REPORT

Box I  Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(8)(b) 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 II  Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

Please See Extra 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 fee, this Authority did not invite payment of any additional fee.

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: 1-9

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet(1)) (July 1998)
BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-9, drawn to a bioabsorbable plate and fastener.
Group II, claim(s) 10-15, drawn to a fastener for a bioabsorbable plate.
Group III, claim(s) 16-25, drawn to a driver for inserting fasteners.
Group IV, claims 26-35, drawn to a device for locally heating a portion of a bioabsorbable plate.
Group V, claims 36-49, drawn to a bowl for containing heated fluid.
Group VI, claims 40-45, drawn to a container for holding and delivering fasteners.
Group VII, claims 46-48, drawn to a device for handling osteosynthesis plates.
Group VIII, claims 49-54, drawn to a template.
Group IX, claim 55, drawn to a drill bit tool.
Group X, claim 56, drawn to a kit for delivering items related to surgically repairing a bone structure.
Group XI, claims 57-62, drawn to a method for repairing broken bone.

The inventions listed as Groups I-XI do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: none of the specifics of any of the groups is required by any of the other groups.