

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number  
**WO 2005/087125 A3**

- (51) International Patent Classification<sup>7</sup>: **A61B 19/00**
- (21) International Application Number:  
PCT/GB2005/000933
- (22) International Filing Date: 10 March 2005 (10.03.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
04251371.3 10 March 2004 (10.03.2004) EP  
60/575,389 1 June 2004 (01.06.2004) US
- (71) Applicants (for all designated States except US): **DEPUY INTERNATIONAL LTD** [GB/GB]; St Anthony's Road, Leeds LS11 8DT (GB). **DEPUY ORTHOPADIE GMBH** [DE/DE]; Ammerthalstrasse 3, 85551 Heimstetten (DE). **BRAINLAB AG** [DE/DE]; Ammerthalstrasse 8, 85551 Heimstetten (DE). **BIOSENSE WEBSTER INC** [US/US]; 3333 Diamond Canyon Road, Diamond Bar, CA 91765 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **REVIE, Ian** [GB/GB]; Tutt House, New Row, Boroughbridge YO51 9AX (GB). **ASHBY, Alan** [GB/GB]; 19 Clifton Green,

York, YO30 6LN (GB). **BURGER, Thorsten** [DE/DE]; Speyererstr. 8, 80804 Munchen (DE). **VILSMEIER, Stefan** [DE/AT]; Oberer Stadtplatz 6, 6330 Kufstein (AT). **GOVARI, Assaf** [IL/IL]; Vitzo 1, Haifa (IL). **REZNIK, Dudi** [IL/IL]; Peleg 33 st, Shimshit, POB 17906 (IL). **SUSEL, Pesach** [IL/IL]; 43 Varida St, Haifa (IL). **SHALGI, Avi** [IL/IL]; 32 Shlomo Ben-Yosef St, 69125 Tel-Aviv (IL).

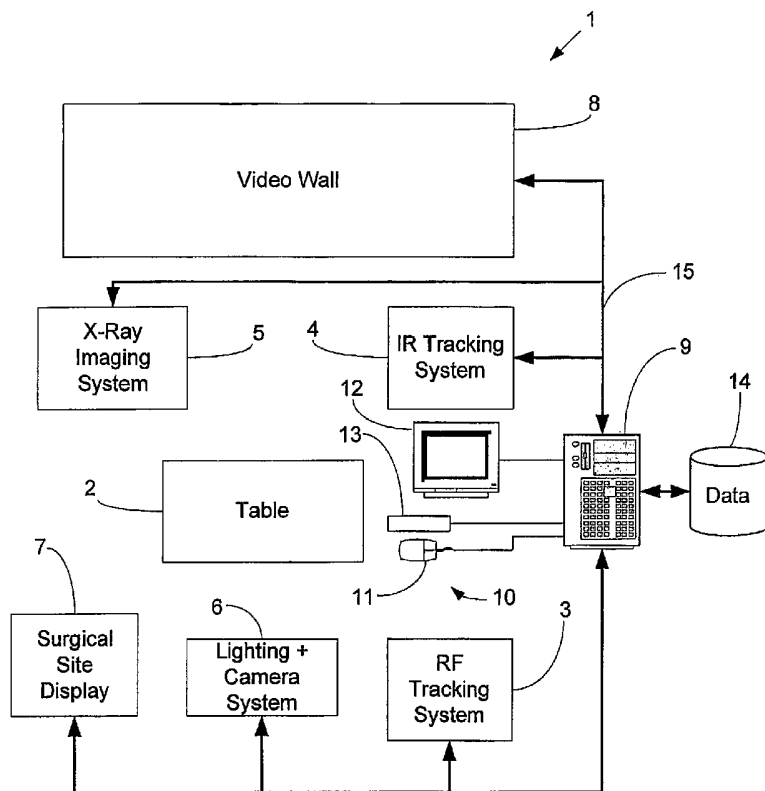
(74) Agent: **ALTON, Andrew**; Urquhart-Dykes & Lord LLP, Tower North Central, Merrion Way, Leeds LS2 8PA (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: ORTHOPAEDIC OPERATING SYSTEMS, METHODS, IMPLANTS AND INSTRUMENTS



(57) Abstract: Orthopaedic operating systems, operating rooms, computer aided surgical methods, trackable implants, instruments and surgical planning and IGS software applications are described. The integrated surgical system is for use in an orthopaedic operating room to enable a surgeon to carry out a computer aided surgical procedure on a subject. A subject support, wireless magnetic tracking system, registration system, at least a first display device, a control system and a surgeon interface operable by the surgeon to control operation of the plurality of parts of the integrated surgical system are provided. The method comprises determining the position of at least a first marker being wirelessly tracked by a wireless magnetic tracking system, registering the position of the body part of the subject with an image of the body part of the subject, displaying a registered image of the body part of the subject and at least an image representative of an implant, and receiving a command from a surgeon interface operable by the surgeon.

WO 2005/087125 A3



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report*

**(88) Date of publication of the international search report:**  
23 March 2006

*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  
T/GB2005/000933

**A. CLASSIFICATION OF SUBJECT MATTER**  
A61B19/00

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 2004/001569 A (CEDARA SOFTWARE CORP; SATI, MARWAN; CROITORU, HANIEL; TATE, PETER; FU,) 31 December 2003 (2003-12-31)	1,3-39, 42, 44-71,85
Y	the whole document	2,43
Y	US 6 611 141 B1 (SCHULZ WALDEAN A ET AL) 26 August 2003 (2003-08-26) column 3, line 21 - line 29; figure 2	2,43
X	EP 1 096 268 A (NORTHERN DIGITAL INC) 2 May 2001 (2001-05-02) the whole document	1-39, 42-71,85
A	US 2001/036245 A1 (KIENZLE THOMAS C ET AL) 1 November 2001 (2001-11-01) figure 13	1
	----- -/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in 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

11 August 2005

Date of mailing of the international search report

07. 12. 2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Held, G

INTERNATIONAL SEARCH REPORT

national Application No  
T/GB2005/000933

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 6 235 038 B1 (HUNTER MARK W ET AL) 22 May 2001 (2001-05-22) column 4, line 40 - line 59; figure 1 -----	1-39, 42-71,85
A	US 2002/198448 A1 (ZUK YUVAL ET AL) 26 December 2002 (2002-12-26) the whole document -----	1-39, 42-69
A	US 6 499 488 B1 (HUNTER MARK W ET AL) 31 December 2002 (2002-12-31) cited in the application figures -----	1-39, 42-69

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2005/000933

## Box 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.: 86-95  
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 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 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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- 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: 1-39,42-69,70,71,85

An integrated surgical system.

---

2. claims: 39-41

A dummy body part

---

3. claims: 72-82,83,84

A wirelessly trackable prosthetic joint.

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/GB2005/000933

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
WO 2004001569	A	31-12-2003	AU 2003245758 A1 EP 1550024 A2	06-01-2004 06-07-2005
US 6611141	B1	26-08-2003	NONE	
EP 1096268	A	02-05-2001	CA 2324894 A1 CN 1323571 A DE 1096268 T1 JP 2001201316 A US 6288785 B1	28-04-2001 28-11-2001 17-01-2002 27-07-2001 11-09-2001
US 2001036245	A1	01-11-2001	AU 3857900 A EP 1158891 A2 WO 0047103 A2 US 6285902 B1	29-08-2000 05-12-2001 17-08-2000 04-09-2001
US 6235038	B1	22-05-2001	AU 2617801 A DE 10083670 T0 WO 0134050 A2 US 2001011175 A1	06-06-2001 14-03-2002 17-05-2001 02-08-2001
US 2002198448	A1	26-12-2002	NONE	
US 6499488	B1	31-12-2002	AU 1353301 A DE 10085137 T0 EP 1257223 A1 WO 0130257 A1 US 2003066538 A1	08-05-2001 07-11-2002 20-11-2002 03-05-2001 10-04-2003