${\bf (19)}\ World\ Intellectual\ Property\ Organization$

International Bureau





(43) International Publication Date 27 December 2007 (27.12.2007)

(10) International Publication Number WO 2007/149559 A3

- (51) International Patent Classification: *A61B 19/00* (2006.01)
- (21) International Application Number:

PCT/US2007/014567

- (22) International Filing Date: 21 June 2007 (21.06.2007)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:

60/815,741	22 June 2006 (22.06.2006)	US
60/845,603	19 September 2006 (19.09.2006)	US
60/868,030	30 November 2006 (30.11.2006)	US
60/884,792	12 January 2007 (12.01.2007)	US
60/888,182	5 February 2007 (05.02.2007)	US

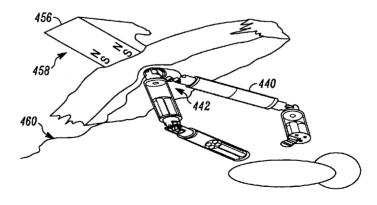
- (71) Applicant (for all designated States except US): BOARD OF REGENTS OF THE UNIVERSITY OF NE-BRASKA [US/US]; Varner Hall, 3835 Holdrege Street, Lincoln, Nebraska 68583-0745 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): FARRITOR, Shane [US/US]; 6137 Blackstone Rd, Lincoln, NE 68526 (US). LEHMAN, AMY [US/US]; 1752 Karol Kay Blvd., Seward, NE 68434 (US). WOOD, Nathan A. [US/US]; 2140 Bear Creek Road, Papillion, NE 68133 (US). RENTSCHLER, Mark [US/US]; 1302 S. 51st Avenue, Omaha, NE 68106 (US). DUMPERT, Jason [US/US]; 14514 Willow Creek Drive, Omaha, NE 68138 (US). PLATT, Steve [US/US]; 1726 Branched Oak Road, Garland, NE 68360 (US). OLEYNIKOV, Dmitry [US/US]; 13330 Binney Street, Omaha, NE 68164 (US).

- (74) Agents: SOLBERG, Sean et al.; 2200 Wells Fargo Center, 90 South Seventh Street, Minneapolis, Minnesota 55402-3901 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, 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, LV, MC, MT, 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
- 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: 19 June 2008

(54) Title: MAGNETICALLY COUPLEABLE ROBOTIC DEVICES AND RELATED METHODS



(57) Abstract: The present invention relates to magnetically coupleable robotic surgical devices. More specifically, the present invention relates to robotic surgical devices that can be inserted into a patient's body and can be positioned within the patient's body using an external magnet.





INTERNATIONAL SEARCH REPORT

International application No PCT/US2007/014567

A. CLASSIFICATION OF SUBJECT MATTER INV. A61B19/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 $\label{lem:minimum} \mbox{ Minimum documentation searched (classification system followed by classification symbols)} \\ \mbox{ A61B}$

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, WPI Data

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
X Y	US 2005/288555 A1 (BINMOELLER KENNETH E [US]) 29 December 2005 (2005-12-29) paragraphs [0044], [0055], [0062], [0063], [0073]; figures 11a,b	1-21, 31-39 46	
X	US 2004/176664 A1 (IDDAN GAVRIEL J [US] IDDAN GAVRIEL J [IL]) 9 September 2004 (2004-09-09)	 1-3, 5-13, 15-19, 21,31, 33-35, 37-39	
	paragraphs [0037], [0038], [0044], [0045]; figure 7		
X	US 2004/050394 A1 (JIN SUNGHO [US]) 18 March 2004 (2004-03-18) paragraphs [0003], [0014], [0016], [0019]; figures 1,3	31-39	
		·	

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
17 April 2008	28/04/2008
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 Mayer-Martenson, E

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/014567

		101/0,3200	
(Continua	tion). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages		Relevant to claim No.
X	US 2005/096502 A1 (KHALILI THEODORE M [US]) 5 May 2005 (2005-05-05) paragraphs [0078] - [0081]; figure 13		1-3,5-7, 9,11-13, 15-19, 21,31, 33-35, 37-39
X	US 2003/020810 A1 (TAKIZAWA HIRONOBU [JP] FT AL) 30 January 2003 (2003-01-30)		40-45
Y A	paragraphs [0173] - [0176]; figure 20 US 2005/029978 A1 (OLEYNIKOV DMITRY [US] ET AL) 10 February 2005 (2005-02-10) abstract		1,11
A	US 2004/138552 A1 (HAREL ALEX [IL] ET AL) 15 July 2004 (2004-07-15) abstract		1,4,8, 11,14
A	PEIRS J ET AL: "A miniature manipulator for integration in a self-propelling endoscope" SENSORS AND ACTUATORS A, ELSEVIER SEQUOIA S.A., LAUSANNE, CH, vol. 92, no. 1-3, 1 August 2001 (2001-08-01), pages 343-349, XP004274067 ISSN: 0924-4247 abstract; figure 1	•	1,11
		•	•
		÷ .	

International application No. PCT/US2007/014567

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. X Claims Nos.: 22-30, 47-54 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
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. X As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable 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 reportcovers 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-21,31-39

robotic device with operational arm

2. claims: 40-46

robotic device with sensor and transparent component

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2007/014567

Patent document cited in search report		Publication date	Patent family Publication member(s) date
US 2005288555	A1	29-12-2005	NONE
US 2004176664	A1	09-09-2004	US 2005272974 A1 08-12-2005
US 2004050394	A1	18-03-2004	NONE
US 2005096502	A1	05-05-2005	WO 2005044095 A1 19-05-2005
US 2003020810	A1	30-01-2003	JP 2003038424 A 12-02-2003
US 2005029978	A1	10-02-2005	US 2006119304 A1 08-06-2006 US 2006196301 A1 07-09-2006 US 2006198619 A1 07-09-2006 US 2007241714 A1 18-10-2007
US 2004138552	A1	15-07-2004	NONE