

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 June 2006 (01.06.2006)

PCT

(10) International Publication Number
WO 2006/057702 A3

(51) International Patent Classification:

A61B 19/00 (2006.01) B25J 9/10 (2006.01)
A61B 1/005 (2006.01) B25J 15/00 (2006.01)
A61B 1/008 (2006.01) B25J 13/02 (2006.01)
B25J 3/00 (2006.01)

(21) International Application Number:

PCT/US2005/033377

(22) International Filing Date:

19 September 2005 (19.09.2005)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10/997,249 24 November 2004 (24.11.2004) US

(71) Applicant (for all designated States except US): **NOVARE SURGICAL SYSTEMS, INC.** [US/US]; 10440A Bubb Road, Cupertino, CA 95014 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DANITZ, David, J.** [US/US]; 5030 New Trier Avenue, San Jose, CA 95136 (US). **HINMAN, Cameron, Dale** [US/US]; 500 Roaring Gap Road, Thurmond, NC 28683 (US).

(74) Agents: **MAYER, Mika** et al.; Morrison & Foerster, LLP, 755 Page Mill Road, Palo Alto, CA 94304-1018 (US).

(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, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, 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.

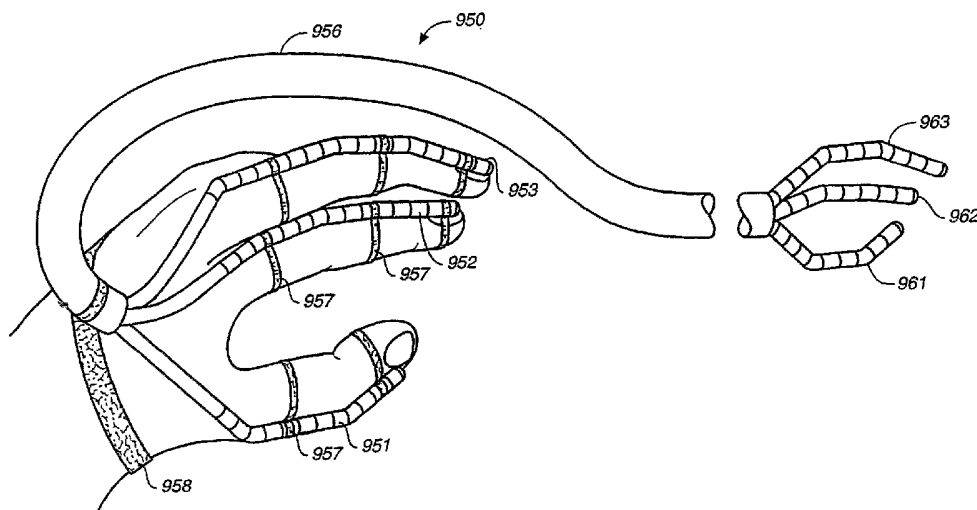
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, 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

[Continued on next page]

(54) Title: HAND-ACTUATED DEVICE FOR REMOTE MANIPULATION OF A GRASPING TOOL



(57) Abstract: The invention provides an articulating mechanism useful, for example, for remote manipulation of various surgical instruments and diagnostic tools within, or to, regions of the body. Movement of segments (A1, B1, D1) at the proximal end (106, 107, 121, 606, 806, 1711, 1801) of the mechanism results in a corresponding, relative movement of segments (A2, B2, D2) at the distal end (108, 109, 123, 604, 808, 1721, 1822) of the mechanism. The proximal and distal segments are connected by a set of cables (104) in such a fashion that each proximal segment forms a discrete pair with a distal segment. This configuration allows each segment pair to move independently of one another and also permits the articulating mechanism to undergo complex movements and adopt complex configurations. The articulating mechanisms may also be combined in such a way to remotely mimic finger movements for manipulation of an object or body tissue.

WO 2006/057702 A3



(88) Date of publication of the international search report:

20 July 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
PCT/US2005/033377

A. CLASSIFICATION OF SUBJECT MATTER				
A61B19/00	A61B1/005	A61B1/008		
B25J15/00	B25J13/02	B25J3/00		
B25J9/10				
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 B25J G06F				
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	US 5 807 376 A (VIOLA ET AL) 15 September 1998 (1998-09-15) cited in the application column 4, line 13 - line 65 column 6, line 1 - column 8, line 62 figures 1-18	1-5,7, 15,18		
X	----- US 5 813 813 A (DAUM ET AL) 29 September 1998 (1998-09-29) cited in the application column 1, line 24 - line 33 column 3, line 11 - column 5, line 57 figures ----- -/--	1,3-7,20		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> <td style="width: 50%; border: none; vertical-align: top;"> *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. *G* document member of the same patent family </td> </tr> </table>			*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. *G* document member of the same patent family
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. *G* document member of the same patent family			
Date of the actual completion of the international search	Date of mailing of the international search report			
29 March 2006	11/05/2006			
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 Nistor, L			

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/033377

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 5 441 494 A (ORTIZ ET AL) 15 August 1995 (1995-08-15) cited in the application column 4, line 52 - column 15, line 61 figures 1-7	1-5,7
A	US 4 834 761 A (WALTERS ET AL) 30 May 1989 (1989-05-30) column 4, line 33 - column 5, line 9 column 5, line 45 - column 6, line 6 figures 13-16,19,20	6,20
A	US 2003/036748 A1 (COOPER THOMAS G ET AL) 20 February 2003 (2003-02-20) paragraph [0116] - paragraph [0127]; figures 5-25	1,3-5,7
A	WO 2004/019769 A (NEOGUIDE SYSTEMS, INC; OHLINE, ROBERT, M; TARTAGLIA, JOSEPH, M; BELSON) 11 March 2004 (2004-03-11) paragraph [0046] - paragraph [0079]; figures 1-7B	1,3-5,7
X	US 2002/111604 A1 (DOYLE MARK C ET AL) 15 August 2002 (2002-08-15) paragraph [0032] - paragraph [0033] paragraph [0042] - paragraph [0048] paragraph [0056] - paragraph [0058] paragraph [0065] paragraph [0073] paragraph [0075] - paragraph [0089] figures 1,3A-3D,6A-6D,9A-9D,13	8,10-12, 17,19
X	EP 0 598 618 A (ETHICON INC) 25 May 1994 (1994-05-25) column 4, line 34 - column 18, line 27 figures	8,10,11, 17
X	US 5 549 636 A (LI ET AL) 27 August 1996 (1996-08-27) column 6, line 39 - line 65 column 7, line 45 - line 53 column 9, line 26 - line 57 column 10, line 6 - line 67 figures	8,10,11
A	US 5 143 505 A (BURDEA ET AL) 1 September 1992 (1992-09-01) column 6, line 40 - column 9, line 45 figures 1,4,5A-5E	8,10,13, 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/033377

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.:
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 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: 1-7, 15, 18, 20

a hand-actuated apparatus for remote manipulation of an object comprising multiple pair of links with at least one elongate link coupled to another elongate link by a base joint having the range of motion of a metacarpal phalangeal joint.

1.1. claim: 15

a hand -actuated apparatus for remote manipulation of an object comprising a locking mechanism for locking one or more pairs of links in a fixed position.

2. claims: 8-14, 17, 19

a hand-actuated apparatus for remote manipulation of an object wherein the flexion of a digit of an user is transformed in a translation of a finger slide which in turn is transformed in a bending movement at an effector portion of said apparatus.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2005/033377

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 5807376	A	15-09-1998	CA 2151789 A1	25-12-1995
			EP 0688538 A1	27-12-1995
			JP 8084702 A	02-04-1996
			US 5716352 A	10-02-1998

US 5813813	A	29-09-1998	NONE	

US 5441494	A	15-08-1995	AT 153844 T	15-06-1997
			AU 674418 B2	19-12-1996
			AU 6882494 A	09-02-1995
			CA 2129259 A1	30-01-1995
			DE 69403583 D1	10-07-1997
			DE 69403583 T2	02-10-1997
			EP 0640319 A1	01-03-1995
			ES 2104277 T3	01-10-1997
			GR 94100379 A	30-11-1995
			JP 7194601 A	01-08-1995

US 4834761	A	30-05-1989	NONE	

US 2003036748	A1	20-02-2003	EP 1585425 A2	19-10-2005
			JP 2005502398 T	27-01-2005
			WO 03001986 A2	09-01-2003
			US 2005090809 A1	28-04-2005

WO 2004019769	A	11-03-2004	AU 2003260125 A1	19-03-2004
			CA 2496574 A1	11-03-2004
			CN 1684625 A	19-10-2005
			EP 1534118 A1	01-06-2005
			JP 2005537063 T	08-12-2005
			US 2006052664 A1	09-03-2006

US 2002111604	A1	15-08-2002	US 2003153902 A1	14-08-2003

EP 0598618	A	25-05-1994	AT 170382 T	15-09-1998
			AU 667975 B2	18-04-1996
			AU 5071293 A	02-06-1994
			CA 2103319 A1	20-05-1994
			DE 69320760 D1	08-10-1998
			DE 69320760 T2	04-03-1999
			ES 2119867 T3	16-10-1998
			GR 93100443 A	29-07-1994
			JP 6197900 A	19-07-1994
			US 5346504 A	13-09-1994

US 5549636	A	27-08-1996	NONE	

US 5143505	A	01-09-1992	US 5354162 A	11-10-1994
