

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
6 May 2004 (06.05.2004)

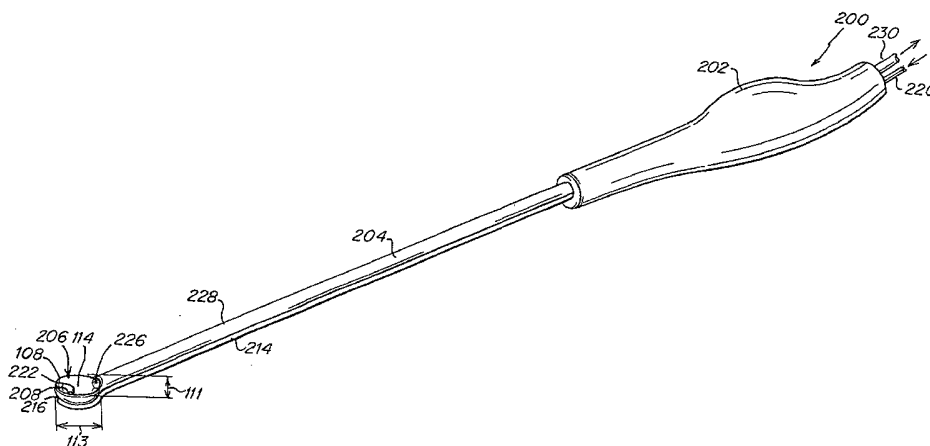
PCT

(10) International Publication Number  
**WO 2004/037095 A3**

- (51) International Patent Classification<sup>7</sup>: **A61B 17/22**, (74) Agent: **POMIANEK, Michael, J.**; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210 (US).  
17/32
- (21) International Application Number: PCT/US2003/034174
- (22) International Filing Date: 27 October 2003 (27.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/421,219 25 October 2002 (25.10.2002) US  
60/488,024 17 July 2003 (17.07.2003) US
- (71) Applicant: **HYDROCISION, INC.** [US/US]; 100 Burt Road, Suite G01, Andover, MA 01810 (US).
- (72) Inventors: **CONNOR, Brian, G.**; 11 High Rock Lane, Newfields, NH 03856 (US). **SYLVESTER, Joseph, P., Jr.**; 6 Caswell Lane, New Hampton, NH 03256 (US). **MODOONO, Paul, T.**; 89 Billerica Road, Chelmsford, MA 01824-3163 (US). **STAD, Kevin, P.**; 20 Boylston Street, Lowell, MA 01852 (US). **REED, David, M.**; 46 Pequot Lane, New Canaan, CT 06840-2020 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, 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, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (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: SURGICAL DEVICES INCORPORATING LIQUID JET ASSISTED TISSUE MANIPULATION AND METHODS FOR THEIR USE



(57) Abstract: Surgical instruments are disclosed that utilize high-pressure liquid jets to perform a variety of useful functions. In certain embodiments, surgical instruments are described incorporating one or more liquid jets utilized to contact tissue excised by a non-liquid jet tissue-cutting component of the surgical instrument for the purpose of further cutting the excised tissue and/or fragmenting and/or disaggregating at least a portion of the excised tissue into a plurality of small particles and/or facilitating or assisting removal of excised tissue from a surgical site without the need to remove the instrument from the surgical site. In certain embodiments, a liquid jet of a surgical instrument can be utilized for the purpose of excising tissue of a patient immobilized and/or manipulated by the surgical instrument. Also described are surgical devices of the type characterized by curettes, rongeurs, bone punches, bone cutting forceps, morcellators, surgical micrograspers, with functionality and performance supplemented by the integration of a liquid jet.



---

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

10 September 2004

*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/ES 03/34174

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61B17/22 A61B17/32		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61B A61M		
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) EP0-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 318 518 A (PLECHINGER ET AL.) 7 June 1994 (1994-06-07)  abstract; figures column 3, lines 15,16 column 5, lines 20-51 -----	1,6,9, 11,12, 18-21, 23-26, 28-31, 39-43
X	US 6 451 017 B1 (MOUTAFIS ET AL.) 17 September 2002 (2002-09-17) abstract; figures column 22, lines 41-51 ----- -/--	1,9-43
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> 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  19 March 2004		Date of mailing of the international search report  16 JUL 2004
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  Giménez Burgos, R

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/34174

## 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 5 782 795 A (BAYS) 21 July 1998 (1998-07-21)  abstract; figures -----	1,9,20, 21, 23-26, 29,30, 39-43
X	US 3 565 062 A (KURIS) 23 February 1971 (1971-02-23)  abstract; claims 1-7; figures column 10, lines 32-38 -----	1,2,4,6, 7,9,10, 20,21, 23, 25-27, 29,30, 39-43
A	US 5 944 686 A (PATTERSON ET AL.) 31 August 1999 (1999-08-31) abstract; figures column 3, lines 10-29 -----	1
A	US 4 690 672 A (VELTRUP) 1 September 1987 (1987-09-01) abstract; figures -----	1
A	EP 0 367 855 A (MATTSON) 16 May 1990 (1990-05-16) column 8, lines 20-48; figures -----	1

# INTERNATIONAL SEARCH REPORT

International application No.  
● PCT/US 03/34174

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.: 91-109, 110-116, 125-132  
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.: 44-90, 117-124  
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:  
see FURTHER INFORMATION sheet PCT/ISA/210
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:

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.:  
1-90, 117-124

### 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

Continuation of Box I.1

Claims Nos.: 91-109,110-116,125-132

Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery

-----

Continuation of Box I.2

Claims Nos.: 44-90,117-124

In view of the large number and also the wording of the claims presently on file, which render it difficult, if not impossible, to determine the matter for which protection is sought, the present application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible. Consequently, the search has been carried out for those parts of the first subject defined which do appear to be clear (and concise), supported and disclosed in the description, namely claims 1-43.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-90,117-124

Surgical instrument for cutting tissue comprising a non-liquid jet tissue cutting component, working in combination with a liquid jet and an evacuation system.

---

2. claims: 133-143

Surgical instrument for cutting tissue comprising a remotely operated tissue manipulation component.

---

3. claims: 144-151

Surgical instrument for cutting tissue comprising a rotatable tissue-contacting component driven by a liquid jet-driven rotor.

---

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/S 03/34174

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5318518	A	07-06-1994	DE 4126886 A1 AT 142111 T DE 59207040 D1 DK 527312 T3 EP 0527312 A1 ES 2091980 T3 JP 2045340 C JP 6197951 A JP 7041042 B	18-02-1993 15-09-1996 10-10-1996 23-12-1996 17-02-1993 16-11-1996 09-04-1996 19-07-1994 10-05-1995
US 6451017	B1	17-09-2002	AU 2779401 A CA 2393608 A1 EP 1246576 A2 JP 2003519525 T WO 0150965 A2 US 2003009166 A1	24-07-2001 19-07-2001 09-10-2002 24-06-2003 19-07-2001 09-01-2003
US 5782795	A	21-07-1998	DE 69624938 D1 DE 69624938 T2 EP 1277602 A1 EP 0871576 A2 WO 9809561 A2 US 6183433 B1	02-01-2003 17-07-2003 22-01-2003 21-10-1998 12-03-1998 06-02-2001
US 3565062	A	23-02-1971	NONE	
US 5944686	A	31-08-1999	WO 9639953 A1	19-12-1996
US 4690672	A	01-09-1987	DE 8426270 U1 AT 39056 T DE 3566612 D1 EP 0175096 A1 JP 1853932 C JP 5066132 B JP 61068035 A	14-02-1985 15-12-1988 12-01-1989 26-03-1986 07-07-1994 21-09-1993 08-04-1986
EP 0367855	A	16-05-1990	US 4785796 A EP 0367855 A1	22-11-1988 16-05-1990