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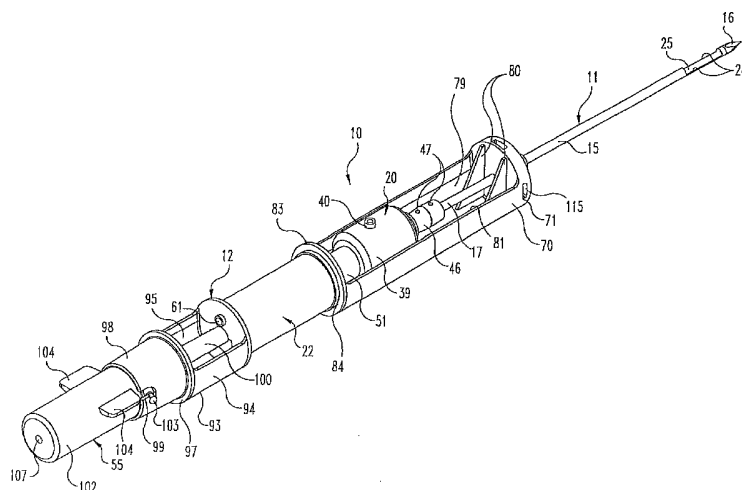
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6 March 2003

[Continued on next page]

(54) Title: BIOPSY APPARATUS



(57) Abstract: A disposable tissue removal device (10) comprises a "tube within a tube" cutting element (11) mounted to a handpiece (10). The inner cannula (17) of the cutting element (11) defines an inner lumen (34) and terminates in an inwardly beveled, razor-sharp cutting edge (35). The inner cannula (17) is driven by both a rotary motor (20) and a reciprocating motor (22). At the end of its stroke, the inner cannula (17) makes contact with a cutting board (31) to completely sever the tissue. An aspiration vacuum is applied to the inner lumen (34) to aspirate excised tissue through the inner cannula (17) and into a collection trap (55) that is removably mounted to the handpiece (10). The rotary and reciprocating motors (20, 22) are hydraulically powered through a foot pedal (175) operated hydraulic circuit (150). The entire tissue removal or biopsy device (10) is configured to be disposable. In one embodiment, the cutting element (11) includes a cannula hub (75) that can be connected to a fluid source, such as a valve-controlled saline bag (400).



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*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/JS 01/51235

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61B10/00				
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				
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				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	US 5 526 822 A (BURBANK FRED H ET AL) 18 June 1996 (1996-06-18) column 13, line 3 - line 56 column 13, line 50 - line 56 column 14, line 40 - line 43 column 14, line 59 - line 67 column 18, line 9 - line 46 column 19, line 6 - line 22 figures 2,3,6,13,15 ---	1-37		
Y	US 5 669 923 A (GORDON MARK G) 23 September 1997 (1997-09-23) column 2, line 51 - line 53 column 15, line 20 - line 23 figures 5-16 ---	1-37		
-/--				
<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 :				
<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.                      "&amp;" 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. "&" 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. "&" document member of the same patent family			
Date of the actual completion of the international search <p style="text-align: center; font-size: 1.2em;">14 August 2002</p>		Date of mailing of the international search report <p style="text-align: center; font-size: 1.2em;">10.12.02</p>		
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 <p style="text-align: center; font-size: 1.2em;">Bridge, S</p>		

INTERNATIONAL SEARCH REPORT

International Application No  
 PCT/JP 01/51235

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 848 978 A (CECCHI MICHAEL) 15 December 1998 (1998-12-15) column 4, line 32 - line 34 ---	1-37
A	US 5 794 626 A (KIETURAKIS MACIEJ J) 18 August 1998 (1998-08-18) column 6, line 53 - line 54 ---	1-37
A	US 3 401 684 A (DREMANN JULES M) 17 September 1968 (1968-09-17) the whole document -----	1-37

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 01/51235

## 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.: 80  
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 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.:

1-37

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: 1-37

PROBLEM : powering a tissue cutting device; SOLUTION : an inner and an outer cannula, a first hydraulic rotary motor, a second hydraulic reciprocating motor and a hydraulic system;

2. Claims: 38-41

PROBLEM : blunting of a tissue cutting device; SOLUTION : an inner and an outer cannula, a motor assembly and a cutting board;

3. Claims: 42-45

PROBLEM : cutting ability of a cannula; SOLUTION : at least one tooth;

4. Claims: 46-51

PROBLEM : rigidity of a cannula; SOLUTION : stiffening member;

5. Claims: 52-53

PROBLEM : surface structure of a cannula; SOLUTION : a dimple;

6. Claims: 54-60

PROBLEM : driving a cannula in two different directions a tissue cutting device; SOLUTION : an inner and an outer cannula, a first motor to move said inner cannula in a first direction, means for supporting said first motor for movement with said inner cannula in a second direction different from said first direction; and a second motor operably coupled to said means for supporting to move said first motor, and thereby said inner cannula, in said second direction while said first motor moves said inner cannula in said first direction;

7. Claims: 61-63

PROBLEM : a tissue cutting device which can be disassembled; SOLUTION : an outer cannula, a cutting member, a hand piece, a vacuum source and a hub attached to said outer cannula and

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

detachably mounted to said hand piece to permit separation of said outer cannula from said hand piece and said cutting member;

## 8. Claims: 64-66

PROBLEM : air flow in a tissue cutting device; SOLUTION : an outer cannula, a cutting member, a hand piece, a vacuum source and a hub defining a leak path between said outer lumen of said outer cannula and atmospheric air when said distal end of said outer cannula is disposed within a body and said hub is disposed outside the body;

## 9. Claim : 67

PROBLEM : drive system for a tissue cutting device for impact cutting of tissue; SOLUTION : an outer and an inner cannula, a cutting board, a piston with a return spring, a source of pressurised fluid, and a pressure switch coupled to said source of pressurised fluid to switch as a function of the magnitude of the fluid pressure within said cylinder;

## 10. Claims: 68-69

PROBLEM : drive system for a tissue cutting device for severing tissue under pressure; SOLUTION : an outer and an inner cannula, a cutting board, a hydraulic reciprocating motor and a hydraulic system connecting said hydraulic motor to a source of pressurised fluid to provide a substantially constant fluid pressure to said motor as said motor advances said inner cannula;

## 11. Claims: 70-76

PROBLEM : MRI compatible tissue cutting device; SOLUTION : an outer and an inner cannula and a drive mechanism operably coupled to said inner cannula to move said inner cannula relative to said tissue-receiving opening in said outer cannula, wherein said drive mechanism is substantially composed of a non-metallic material;

## 12. Claims: 77-79

PROBLEM : connecting a fluid connection tube to a tissue cutting device; SOLUTION : an elongated hand piece defining an elongated channel on an outer surface of said hand piece, a cannula hub mounted to said hand piece and having a fluid port, a tube connected at one end to said fluid port and having an opposite end connectable to a fluid source, said tube disposed within said elongated channel and sized to be

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

recessed within said channel relative to said outer surface,  
an outer cannula and an inner cutting member;

13. Claims: 81-82

PROBLEM : retrieval of severed tissue from a tissue cutting device; SOLUTION : an outer and an inner cannula, a motor assembly for rotating and reciprocating said inner cannula, a vacuum source fluidly coupled to said inner cannula for generating a vacuum in said lumen of said inner cannula to draw severed tissue there through; and a tissue collection chamber interposed between said vacuum source and said open opposite end of said inner cannula to receive severed tissue drawn into said chamber by the vacuum;

14. Claim : 83

PROBLEM : mounting arrangement for the rotary motor in a tissue cutting device; SOLUTION : an outer and an inner cannula, a reciprocating motor for translating a rotary motor and thereby translate said inner cannula within said outer cannula while said inner cannula rotates, a hand piece supporting said rotary motor and said reciprocating motor, said hand piece including a pair of opposite rails, wherein said rotary motor includes a pair of opposite outwardly projecting wings configured to be slidably supported on said opposite rails to resist rotation of said rotary motor while permitting said rotary motor to translate relative to said rails;



INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
PCT/JP 01/51235

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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