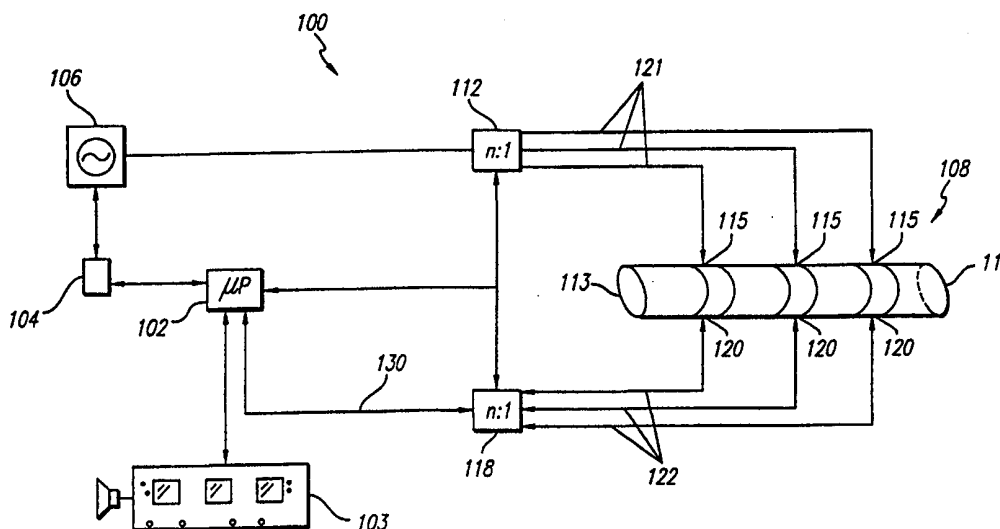


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>A61B 18/14</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 00/15130</b> <b>(43) International Publication Date:</b> 23 March 2000 (23.03.00)
<b>(21) International Application Number:</b> PCT/US99/20431 <b>(22) International Filing Date:</b> 7 September 1999 (07.09.99)  <b>(30) Priority Data:</b> 09/150,830      10 September 1998 (10.09.98)    US 09/150,831      10 September 1998 (10.09.98)    US 09/150,832      10 September 1998 (10.09.98)    US  <b>(71) Applicant:</b> SCIMED LIFE SYSTEMS, INC. [US/US]; One Scimed Place, Maple Grove, MN 55311 (US).  <b>(72) Inventors:</b> SWANSON, David, K.; Apartment 705, 877 Heatherstone Way, Mountain View, CA 94040 (US). BURNSIDE, Robert; 1226 Nilda Avenue, Mountain View, CA 94040 (US). WHAYNE, James, G.; 17930 Los Felice Road, Saratoga, CA 95070 (US). PANESCU, Dorin; Apartment 4, 382 North Fair Oaks, Sunnyvale, CA 94086 (US).  <b>(74) Agent:</b> SLAVIN, Craig, A.; Henricks, Slavin & Holmes LLP, Suite 200, 840 Apollo Street, El Segundo, CA 90245 (US).		<b>(81) Designated States:</b> CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>  <b>(88) Date of publication of the international search report:</b> 13 July 2000 (13.07.00)

(54) Title: SYSTEMS FOR CONTROLLING AN ABLATION PROCESS PERFORMED WITH A HEART ELECTROCATHETER



**(57) Abstract**

Systems for controlling the power supplied to an electrosurgical probe. The systems may be used to monitor electrode-tissue contact, adjust power in response to a loss of contact, and apply power in such a manner that charring, coagulum formation and tissue popping are less likely to occur. The systems used to assess and monitor electrode tissue contact and to control power can be based on testing the value of the impedance at two different test frequencies, the actual temperature, the predicted temperature.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakistan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

## INTERNATIONAL SEARCH REPORT

Int. l. Application No.

PCT/US 99/20431

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61B18/14

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)

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 630 426 A (ASHER) 20 May 1997 (1997-05-20) column 9, line 22-46 column 10, line 9-11 column 11, line 12-21 ---	1
A	US 5 069 223 A (MCRAE) 3 December 1991 (1991-12-03) abstract ---	1
A	US 5 484 400 A (LUNDQUIST INGEMAR H ET AL) 16 January 1996 (1996-01-16) claim 3 ---	1
A	US 5 702 386 A (PANESCU DORIN ET AL) 30 December 1997 (1997-12-30) abstract --- -/-	39

☒ 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.

"Z" document member of the same patent family

Date of the actual completion of the international search

5 April 2000

Date of mailing of the international search report

17.04.2000

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

Papone, F

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/20431

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 96 00036 A (EP TECHNOLOGIES)  4 January 1996 (1996-01-04)  abstract</p>	39

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/ 20431

## 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.:  
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 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.:  
1-16, 39-47
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: 1-16

control system adapted to monitor the impedance at a first frequency and at a second frequency

2. Claims: 17-28

control system to determine the viability of tissue in proximity to the operative element

3. Claims: 29-38

a source of tissue heating energy adapted to supply energy at first and second level and a contact/no contact control system based on a temperature feedback.

4. Claims: 39 -47

control system storing one temperature and managing electrode temperature at constant lower level increasing to stored value at end of process

5. Claims: 48-50

control system having one temperature sensor , storing means for a " coagulation parameter" (?), predictor for hottest temperature, and means for adjusting the coagulation parameter (?) on the temperature PREDICTION

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No

PCT/US 99/20431

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5630426 A	20-05-1997	AU 696729 B AU 5180196 A CA 2214574 A EP 0813387 A WO 9627327 A US 5928159 A US 5947964 A	17-09-1998 23-09-1996 12-09-1996 29-12-1997 12-09-1996 27-07-1999 07-09-1999
US 5069223 A	03-12-1991	WO 9111957 A	22-08-1991
US 5484400 A	16-01-1996	US 5370675 A US 5385544 A AU 2196595 A WO 9525472 A US 5542916 A AT 132046 T AU 671405 B AU 2047595 A AU 657235 B AU 4999893 A BR 9306893 A CA 2121032 A,C CA 2226484 A DE 4305663 A DE 69301143 D DE 69325164 D EP 0611314 A EP 0629382 A EP 0893101 A ES 2084510 T ES 2134295 T FI 950584 A FR 2694700 A GB 2269538 A,B IL 104647 A JP 7503645 T MX 9304905 A NZ 255687 A US 5421819 A US 6022334 A US 5435805 A WO 9404220 A US 5409453 A US 5470308 A US 5366490 A US 5556377 A US 5720718 A US 5542915 A US 5470309 A US 5554110 A US 5549644 A US 5630794 A US 5514131 A US 5672153 A US 5720719 A US 5531676 A US 5536240 A US 5599294 A	06-12-1994 31-01-1995 09-10-1995 28-09-1995 06-08-1996 15-01-1996 22-08-1996 10-08-1995 02-03-1995 15-03-1994 08-12-1998 03-03-1994 03-03-1994 17-02-1994 08-02-1996 08-07-1999 24-08-1994 21-12-1994 27-01-1999 01-05-1996 01-10-1999 04-04-1995 18-02-1994 16-02-1994 31-12-1995 20-04-1995 29-04-1994 20-12-1996 06-06-1995 08-02-2000 25-07-1995 03-03-1994 25-04-1995 28-11-1995 22-11-1994 17-09-1996 24-02-1998 06-08-1996 28-11-1995 10-09-1996 27-08-1996 20-05-1997 07-05-1996 30-09-1997 24-02-1998 02-07-1996 16-07-1996 04-02-1997

## INTERNATIONAL SEARCH REPORT

Information on patent family members

In. .tional Application No

PCT/US 99/20431

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5484400 A		US 5540655 A	30-07-1996
US 5702386 A	30-12-1997	US 5383874 A	24-01-1995
		WO 9600040 A	04-01-1996
		US 5755715 A	26-05-1998
		US 5853409 A	29-12-1998
		CA 2194071 A	11-01-1996
		EP 0767628 A	16-04-1997
		JP 10506544 T	30-06-1998
		WO 9600528 A	11-01-1996
		CA 2148714 A	26-05-1994
		EP 0746249 A	11-12-1996
		JP 8506738 T	23-07-1996
		WO 9410921 A	26-05-1994
		US 5651780 A	29-07-1997
		US 5906614 A	25-05-1999
		US 5688266 A	18-11-1997
		US 5897552 A	27-04-1999
		US 5456682 A	10-10-1995
		AU 3067292 A	07-06-1993
		CA 2106410 A	09-05-1993
		EP 0566725 A	27-10-1993
		JP 8503381 T	16-04-1996
		WO 9308755 A	13-05-1993
		US 5743903 A	28-04-1998
WO 9600036 A	04-01-1996	CA 2194061 A	04-01-1996
		CA 2194062 A	04-01-1996
		CA 2194072 A	04-01-1996
		EP 0768842 A	23-04-1997
		EP 0768841 A	23-04-1997
		EP 0767630 A	16-04-1997
		JP 10505251 T	26-05-1998
		JP 10505252 T	26-05-1998
		JP 10507093 T	14-07-1998
		WO 9600039 A	04-01-1996
		WO 9600043 A	04-01-1996
		US 5735846 A	07-04-1998
		US 5769847 A	23-06-1998
		US 5906614 A	25-05-1999
		US 5810802 A	22-09-1998