



- (51) **International Patent Classification:**
A61B 18/18 (2006.01) *A61N 5/00* (2006.01)
A61M 25/01 (2006.01)
- (21) **International Application Number:**
PCT/US2012/032818
- (22) **International Filing Date:**
9 April 2012 (09.04.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/473,564 8 April 2011 (08.04.2011) US
- (71) **Applicant (for all designated States except US):** VIVANT MEDICAL, INC. [US/US]; 5920 Longbow Drive, Boulder, CO 80301 (US).
- (72) **Inventor; and**
- (73) **Inventor/Applicant (for US only):** BRANNAN, Joseph, D. [US/US]; 3045 Blue Sky Circle #18-201, Erie, CO 80516 (US).
- (74) **Agents:** WILTZIUS, James, J. et al.; Carter, Deluca, Farrell & Schmidt, LLP, 445 Broad Hollow Road, Suite 420, Melville, NY 11747 (US).

- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (88) **Date of publication of the international search report:**
17 January 2013

(54) **Title:** FLEXIBLE MICROWAVE CATHETERS FOR NATURAL OR ARTIFICIAL LUMENS

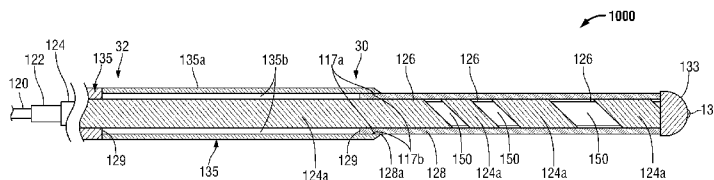


FIG. 44

(57) **Abstract:** A microwave delivery device, including a coaxial feedline having an inner conductor, an inner dielectric insulator coaxially disposed about the inner conductor, and an outer conductor coaxially disposed about the inner dielectric, and a radiating portion operably coupled to a distal end. The radiating portion includes a radiating portion inner conductor operable coupled to and extending from a distal end of the coaxial feedline inner conductor, a shielding outer conductor helically wrapped about the radiating portion inner conductor and operably coupled to the coaxial feedline outer conductor; and a shielding dielectric positioned between the radiating portion inner conductor and the shielding outer conductor wherein the width of the shielding outer conductor varies according to the longitudinal position thereof along the coaxial feedline inner conductor, and a cap operably coupled to a distal end of the radiating portion inner conductor and the shielding outer conductor to provide an electrical connection therebetween.



A. CLASSIFICATION OF SUBJECT MATTER*A61B 18/18(2006.01)i, A61M 25/01(2006.01)i, A61N 5/00(2006.01)i*

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 18/18; A61B 5/05; A61B 5/04; A61B 17/20; A61B 5/042; A61B 18/14; A61B 18/00; A61N 5/00; A61B 17/12; A61B 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: ablation, catheter, energy delivery, conductor.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 05370644 A (EDWIN LANGBERG) 06 December 1994 See abstract, column 9, lines 17-61 and column 10, lines 8-45 and figures 5-9.	1-29
Y	US 2005-0215942 A1 (TIM ABRAHAMSON et al.) 29 September 2005 See abstract, paragraphs 70 and 80 and figures 2A and 8.	1-29
A	US 2007-0027385 A1 (MARK BRISTER et al.) 01 February 2007 See paragraphs 321 and 333 and figure 7B.	1-29
A	WO 94-16632 A1 (CARDIMA, INC.) 04 August 1994 See the whole document.	1-29
A	EP 2147651 A1 (TYCO HEALTHCARE GROUP, LP) 27 January 2010 See the whole document.	1-29

 Further documents are listed in the continuation of Box C. 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 application or patent 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 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 OCTOBER 2012 (19.10.2012)

Date of mailing of the international search report

23 OCTOBER 2012 (23.10.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

YOO Min Jeong

Telephone No. 82-42-481-3463



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 05370644 A	06.12.1994	EP 0445223 A1	11.09.1991
		EP 0445223 B1	19.03.1997
		EP 0497959 A1	09.07.1997
		EP 0745354 A3	08.01.1997
		US 04945912 A	07.08.1990
		US 05230349 A	27.07.1993
		US 05246438 A	21.09.1993
		US 05257635 A	02.11.1993
		US 05370644 A	06.12.1994
		WO 90-06079 A1	14.06.1990
		WO 92-02272 A1	20.02.1992
US 2005-0215942 A1	29.09.2005	CA 2551831 A1	11.08.2005
		EP 1725289 A2	29.11.2006
		EP 1725289 A4	14.11.2007
		JP 2007-520281 A	26.07.2007
		WO 2005-072391 A2	11.08.2005
		WO 2005-072391 A3	26.01.2006
US 2007-0027385 A1	01.02.2007	AU 2001-80886 A1	25.02.2002
		AU 2004-292229 A1	02.06.2005
		AU 2004-292229 B2	17.04.2008
		AU 2006-236319 A1	26.10.2006
		AU 2007-303239 A1	10.04.2008
		AU 2007-305002 A1	10.04.2008
		AU 2008-230832 A1	02.10.2008
		AU 2008-266162 A1	24.12.2008
		AU 2008-316630 A1	30.04.2009
		CA 2546072 A1	02.06.2005
		CA 2606770 A1	26.10.2006
		CA 2664426 A1	10.04.2008
		CA 2664528 A1	10.04.2008
		CA 2681412 A1	02.10.2008
		CA 2687980 A1	24.12.2008
		CA 2702799 A1	30.04.2009
		CN 100589003 C	10.02.2010
		CN 101163998 A0	16.04.2008
		CN 101547633 A	30.09.2009
		CN 101923195 A	22.12.2010
		CN 1922525 A	28.02.2007
		EP 1011425 A1	28.06.2000
		EP 1011425 B1	02.05.2007
		EP 1624907 A2	15.02.2006
		EP 1624908 A2	15.02.2006
		EP 1624908 B1	05.01.2011
		EP 1624908 B8	15.06.2011
		EP 1648293 A1	26.04.2006
		EP 1648298 A2	26.04.2006
		EP 1692556 A2	23.08.2006

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 1711789 A2	18. 10. 2006
		EP 1711790 A2	18. 10. 2006
		EP 1711790 B1	08. 09. 2010
		EP 1711791 A2	18. 10. 2006
		EP 1711802 A2	18. 10. 2006
		EP 1711802 B1	14. 07. 2010
		EP 1718350 A1	08. 11. 2006
		EP 1742568 A2	17. 01. 2007
		EP 1776036 A1	25. 04. 2007
		EP 1804650 A1	11. 07. 2007
		EP 1804650 B1	14. 03. 2012
		EP 1855588 A2	21. 11. 2007
		EP 1875285 A2	09. 01. 2008
		EP 1893084 A2	05. 03. 2008
		EP 1914578 A2	23. 04. 2008
		EP 1914578 A3	30. 04. 2008
		EP 1991110 A2	19. 11. 2008
		EP 2004796 A2	24. 12. 2008
		EP 2069772 A2	17. 06. 2009
		EP 2091409 A2	26. 08. 2009
		EP 2129285 A1	09. 12. 2009
		EP 2155045 A1	24. 02. 2010
		EP 2203741 A1	07. 07. 2010
		EP 2223710 A1	01. 09. 2010
		EP 2226086 A1	08. 09. 2010
		EP 2228642 A1	15. 09. 2010
		EP 2239566 A2	13. 10. 2010
		EP 2239566 A3	17. 11. 2010
		EP 2239567 A2	13. 10. 2010
		EP 2239567 A3	17. 11. 2010
		EP 2256493 A1	01. 12. 2010
		EP 2264499 A2	22. 12. 2010
		EP 2264499 A3	05. 01. 2011
		EP 2264500 A2	22. 12. 2010
		EP 2264500 A3	05. 01. 2011
		EP 2264501 A2	22. 12. 2010
		EP 2264501 A3	05. 01. 2011
		EP 2264501 B1	25. 07. 2012
		EP 2301428 A1	30. 03. 2011
		EP 2316331 A1	04. 05. 2011
		EP 2322094 A1	18. 05. 2011
		EP 2327362 A1	01. 06. 2011
		EP 2327984 A2	01. 06. 2011
		EP 2327984 A3	07. 09. 2011
		EP 2329763 A1	08. 06. 2011
		EP 2329770 A1	08. 06. 2011
		EP 2329771 A2	08. 06. 2011
		EP 2329771 A3	22. 06. 2011
		EP 2332466 A1	15. 06. 2011
		EP 2335581 A1	22. 06. 2011

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		EP 2335582 A1	22.06.2011
		EP 2335583 A2	22.06.2011
		EP 2335583 A3	31.08.2011
		EP 2335584 A2	22.06.2011
		EP 2335584 A3	31.08.2011
		EP 2335585 A2	22.06.2011
		EP 2335585 A3	31.08.2011
		EP 2335586 A1	22.06.2011
		EP 2335587 A2	22.06.2011
		EP 2335587 A3	07.09.2011
		EP 2433563 A2	28.03.2012
		EP 2448485 A2	09.05.2012
		EP 2448486 A2	09.05.2012
		EP 2494921 A2	05.09.2012
		EP 2494922 A2	05.09.2012
		JP 04-124827 B2	23.07.2008
		JP 04-708342 B2	25.03.2011
		JP 04-728249 B2	22.04.2011
		JP 04-786653 B2	22.07.2011
		JP 04-870075 B2	25.11.2011
		JP 2001-510382 A	31.07.2001
		JP 2006-525853 A	16.11.2006
		JP 2007-501028 A	25.01.2007
		JP 2007-501684 A	01.02.2007
		JP 2007-511737 A	10.05.2007
		JP 2007-514964 A	07.06.2007
		JP 2007-525276 A	06.09.2007
		JP 2007-535991 A	13.12.2007
		JP 2008-096448 A	24.04.2008
		JP 2008-506468 A	06.03.2008
		JP 2008-506469 A	06.03.2008
		JP 2008-538424 A	23.10.2008
		JP 2010-505534 A	25.02.2010
		JP 2011-224381 A	10.11.2011
		JP 2012-016597 A	26.01.2012
		JP 2012-110730 A	14.06.2012
		KR 10-2006-0132603 A	21.12.2006
		KR 10-2008-0005432 A	11.01.2008
		KR 10-2012-0034797 A	12.04.2012
		US 06001067 A	14.12.1999
		US 2004-011671 A1	22.01.2004
		US 2004-045879 A1	11.03.2004
		US 2005-027180 A1	03.02.2005
		US 2005-027181 A1	03.02.2005
		US 2005-027462 A1	03.02.2005
		US 2005-027463 A1	03.02.2005
		US 2005-031689 A1	10.02.2005
		US 2005-033132 A1	10.02.2005
		US 2005-043598 A1	24.02.2005
		US 2005-054909 A1	10.03.2005

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2005-105873 A1	19.05.2005
		US 2005-112169 A1	26.05.2005
		US 2005-124873 A1	09.06.2005
		US 2005-129379 A1	16.06.2005
		US 2005-143635 A1	30.06.2005
		US 2005-154271 A1	14.07.2005
		US 2005-176136 A1	11.08.2005
		US 2005-177036 A1	11.08.2005
		US 2005-187720 A1	25.08.2005
		US 2005-192557 A1	01.09.2005
		US 2005-203360 A1	15.09.2005
		US 2005-232567 A1	20.10.2005
		US 2005-245795 A1	03.11.2005
		US 2006-008231 A1	12.01.2006
		US 2006-008232 A1	12.01.2006
		US 2006-008233 A1	12.01.2006
		US 2006-008234 A1	12.01.2006
		US 2006-015024 A1	19.01.2006
		US 2006-016700 A1	26.01.2006
		US 2006-019327 A1	26.01.2006
		US 2006-020186 A1	26.01.2006
		US 2006-020187 A1	26.01.2006
		US 2006-020188 A1	26.01.2006
		US 2006-020189 A1	26.01.2006
		US 2006-020190 A1	26.01.2006
		US 2006-020191 A1	26.01.2006
		US 2006-020192 A1	26.01.2006
		US 2006-036139 A1	16.02.2006
		US 2006-036140 A1	16.02.2006
		US 2006-036141 A1	16.02.2006
		US 2006-036142 A1	16.02.2006
		US 2006-036143 A1	16.02.2006
		US 2006-036144 A1	16.02.2006
		US 2006-036145 A1	16.02.2006
		US 2006-040402 A1	23.02.2006
		US 2006-142651 A1	29.06.2006
		US 2006-155180 A1	13.07.2006
		US 2006-183984 A1	17.08.2006
		US 2006-183985 A1	17.08.2006
		US 2006-189856 A1	24.08.2006
		US 2006-195029 A1	31.08.2006
		US 2006-198864 A1	07.09.2006
		US 2006-200019 A1	07.09.2006
		US 2006-200020 A1	07.09.2006
		US 2006-200970 A1	14.09.2006
		US 2006-204536 A1	14.09.2006
		US 2006-222566 A1	05.10.2006
		US 2006-229512 A1	12.10.2006
		US 2006-235285 A1	19.10.2006
		US 2006-249381 A1	09.11.2006

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2006-252027 A1	09.11.2006
		US 2006-253012 A1	09.11.2006
		US 2006-258929 A1	16.11.2006
		US 2006-270922 A1	30.11.2006
		US 2006-270923 A1	30.11.2006
		US 2007-016381 A1	18.01.2007
		US 2007-027370 A1	01.02.2007
		US 2007-027384 A1	01.02.2007
		US 2007-032706 A1	08.02.2007
		US 2007-032717 A1	08.02.2007
		US 2007-032718 A1	08.02.2007
		US 2007-038044 A1	15.02.2007
		US 2007-045902 A1	01.03.2007
		US 2007-059196 A1	15.03.2007
		US 2007-066873 A1	22.03.2007
		US 2007-093704 A1	26.04.2007
		US 2007-163880 A1	19.07.2007
		US 6435708 B1	20.08.2002
		US 6558321 B1	06.05.2003
		US 6741877 B1	25.05.2004
		US 6862465 B2	01.03.2005
		US 6931327 B2	16.08.2005
		US 7103255 B2	05.09.2006
		US 7110803 B2	19.09.2006
		US 7136689 B2	14.11.2006
		US 7146089 B2	05.12.2006
		US 7171102 B2	30.01.2007
		US 7192450 B2	20.03.2007
		US 7276029 B2	02.10.2007
		US 7310544 B2	18.12.2007
		US 7366556 B2	29.04.2008
		US 7379765 B2	27.05.2008
		US 7424318 B2	09.09.2008
		US 7460898 B2	02.12.2008
		US 7467003 B2	16.12.2008
		US 7494465 B2	24.02.2009
		US 7497827 B2	03.03.2009
		US 7519408 B2	14.04.2009
		US 7583990 B2	01.09.2009
		US 7591801 B2	22.09.2009
		US 7599726 B2	06.10.2009
		US 7613491 B2	03.11.2009
		US 7615007 B2	10.11.2009
		US 7640048 B2	29.12.2009
		US 7651596 B2	26.01.2010
		US 7654956 B2	02.02.2010
		US 7657297 B2	02.02.2010
		US 7711402 B2	04.05.2010
		US 7713574 B2	11.05.2010
		US 7715893 B2	11.05.2010

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 7761130 B2	20.07.2010
		US 7771352 B2	10.08.2010
		US 7774145 B2	10.08.2010
		US 7775975 B2	17.08.2010
		US 7778680 B2	17.08.2010
		US 7783333 B2	24.08.2010
		US 7792562 B2	07.09.2010
		US 7797028 B2	14.09.2010
		US 7826981 B2	02.11.2010
		US 7828728 B2	09.11.2010
		US 7831287 B2	09.11.2010
		US 7835777 B2	16.11.2010
		US 7857760 B2	28.12.2010
		US 7860545 B2	28.12.2010
		US 7873255 B2	18.01.2011
		US 7875293 B2	25.01.2011
		US 7885697 B2	08.02.2011
		US 7896809 B2	01.03.2011
		US 7899511 B2	01.03.2011
		US 7901354 B2	08.03.2011
		US 7905833 B2	15.03.2011
		US 7914450 B2	29.03.2011
		US 7917186 B2	29.03.2011
		US 7920906 B2	05.04.2011
		US 7925321 B2	12.04.2011
		US 7927274 B2	19.04.2011
		US 7933639 B2	26.04.2011
		US 7935057 B2	03.05.2011
		US 7946984 B2	24.05.2011
		US 7949381 B2	24.05.2011
		US 7955261 B2	07.06.2011
		US 7959569 B2	14.06.2011
		US 7970448 B2	28.06.2011
		US 7974672 B2	05.07.2011
		US 7976492 B2	12.07.2011
		US 7979104 B2	12.07.2011
		US 7986986 B2	26.07.2011
		US 7998071 B2	16.08.2011
		US 8000901 B2	16.08.2011
		US 8005335 B2	23.08.2011
		US 8005524 B2	23.08.2011
		US 8005525 B2	23.08.2011
		US 8010174 B2	30.08.2011
		US 8060173 B2	15.11.2011
		US 8064977 B2	22.11.2011
		US 8073519 B2	06.12.2011
		US 8073520 B2	06.12.2011
WO 94-16632 A1	04.08.1994	AU 6233694 A	15.08.1994
		AU 692762 B2	18.06.1998

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032818

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CA 2154773 A1	04.08.1994
		CA 2154773 C	12.10.2004
		CA 2154774 A1	04.08.1994
		CA 2154774 C	02.01.2007
		EP 0681450 A1	05.09.2001
		EP 0681450 B1	20.03.2002
		EP 0681451 A1	13.12.2000
		EP 0681451 B1	05.09.2001
		EP 0682502 A1	04.04.2001
		EP 0682502 B1	24.07.2002
		EP 0825829 A1	18.08.2004
		JP 03-370093 B2	15.11.2002
		JP 03-488716 B2	31.10.2003
		JP 03-785190 B2	14.06.2006
		JP 08-506034 A	02.07.1996
		JP 08-506251 A	09.07.1996
		JP 08-506252 A	09.07.1996
		JP 11-514250 A	07.12.1999
		US 05509411 A	23.04.1996
		US 05645064 A	08.07.1997
		US 05645082 A	08.07.1997
		US 05682885 A	04.11.1997
		US 05685322 A	11.11.1997
		US 05699796 A	23.12.1997
		US 05706809 A	13.01.1998
		US 05711298 A	27.01.1998
		US 05881732 A	16.03.1999
		US 05957842 A	28.09.1999
		US 05960796 A	05.10.1999
		US 05967978 A	19.10.1999
		US 06088610 A	11.07.2000
		US 06141576 A	31.10.2000
		WO 94-16618 A1	04.08.1994
		WO 94-16619 A1	04.08.1994
		WO 94-16632 A1	04.08.1994
		WO 96-36277 A1	21.11.1996
EP 2147651 A1	27.01.2010	US 2010-0023008 A1	28.01.2010