



- (51) **International Patent Classification:**
A61N 1/368 (2006.01) A61N 1/37 (2006.01)
- (21) **International Application Number:**
PCT/US2013/023411
- (22) **International Filing Date:**
28 January 2013 (28.01.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
13/361,635 30 January 2012 (30.01.2012) US
- (71) **Applicant: MEDTRONIC, INC.** [US/US]; 710 Medtronic Parkway NE, Minneapolis, Minnesota 55432 (US).
- (72) **Inventors: SAMBELASHVILI, Aleksandre, T.;** 710 Medtronic Parkway NE, Minneapolis, Minnesota 55432 (US). **MULLEN, Thomas, J.;** 710 Medtronic Parkway NE, Minneapolis, Minnesota 55432 (US). **SHELDON, Todd, J.;** 710 Medtronic Parkway NE, Minneapolis, Minnesota 55432 (US).
- (74) **Agent: BARRY, Carol, F.;** 710 Medtronic Parkway Ne, Minneapolis, MN 55432 (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, BN, 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, PA, 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, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) **Date of publication of the international search report:**
26 September 2013

(54) **Title:** SYSTEM FOR ADAPTIVE CARDIAC RESYNCHRONIZATION THERAPY BASED ON AN INDICATION OF INTRINSIC ATRIOVENTRICULAR CONDUCTION

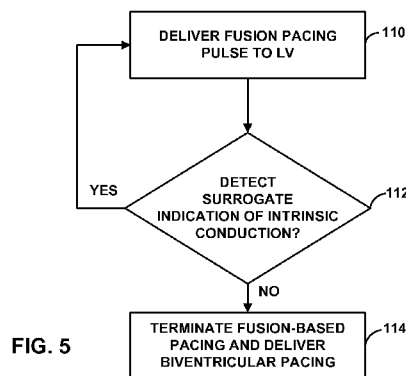


FIG. 5

(57) **Abstract:** Cardiac resynchronization therapy (CRT) delivered to a heart of a patient may be adjusted based on detection (112) of a surrogate indication of the intrinsic atrioventricular conduction of the heart. In some examples, the surrogate indication is determined to be a sense event of the first depolarizing ventricle of the heart within a predetermined period of time following the delivery of a fusion pacing stimulus to the later depolarizing ventricle. In some examples, the CRT is switched (114) from a fusion pacing configuration to a biventricular pacing configuration if the surrogate indication is not detected, and the CRT is maintained (110) in a fusion pacing configuration if the surrogate indication is detected.

WO 2013/116145 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/023411

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N1/368 A61N1/37
ADD.

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)
A61N

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/069032 A1 (MEDTRONIC INC [US]; SHELDON TODD J [US]; STROEBEL JOHN C [US]; PARIKH) 29 June 2006 (2006-06-29) page 8, line 19 - line 29 page 13, line 18 - line 27 page 14, line 23 - page 15, line 20 page 16, line 4 - line 16 page 19, line 5 - page 20, line 13 page 22, line 6 - page 23, line 20 page 24, line 29 - page 25, line 3; figure 3	1-7
X	----- US 2006/287685 A1 (MEYER SCOTT A [US] ET AL) 21 December 2006 (2006-12-21) paragraph [0030] - paragraph [0039] paragraph [0116] - paragraph [0118]; figures 5A, 5B, 13E-13I ----- -/--	1

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
---	---

Date of the actual completion of the international search 30 April 2013	Date of mailing of the international search report 13/08/2013
--	--

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Sigurd, Karin
--	---

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/023411

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 2010/114232 A1 (MIN XIAOYI [US]) 6 May 2010 (2010-05-06) paragraph [0026] - paragraph [0030] paragraph [0067] - paragraph [0069]; figures 1, 4	1
A	----- US 2010/234916 A1 (TURCOTT ROBERT [US] ET AL) 16 September 2010 (2010-09-16) paragraph [0052] - paragraph [0055] paragraph [0063] - paragraph [0068]; figure 5 -----	1-7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/023411

Box No. 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 No. 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 fees, this Authority did not invite payment of additional fees.

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.:

1-7

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/ US2013/ 023411

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

System configured to i) provide fusion pacing therapy if a surrogate indication of intrinsic conduction is detected or if a surrogate indication of intrinsic conduction is not detected and the value of a counter is still below a threshold and to ii) provide biventricular pacing or stop therapy to determine a measurement otherwise.

2. claims: 8-10

System configured to determine detection of a surrogate indication of intrinsic conduction if i) a determined time interval between an atrial pace or sense event and an activation of the second ventricle is substantially equal to an intrinsic conduction time measurement and/or if ii) a determined time interval between a ventricular pacing stimulus delivered to the first ventricle and an activation of the second ventricle increases when the time interval between an atrial pace or sense event and the ventricular pacing stimulus is decreased.

3. claims: 11-13

System configured to adjust a pacing interval based on a determined time interval between an atrial pace or sense event and an activation of the second ventricle.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/023411

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
WO 2006069032	A1	29-06-2006	EP 1833563 A1	19-09-2007
			WO 2006069032 A1	29-06-2006

US 2006287685	A1	21-12-2006	NONE	

US 2010114232	A1	06-05-2010	NONE	

US 2010234916	A1	16-09-2010	NONE	
