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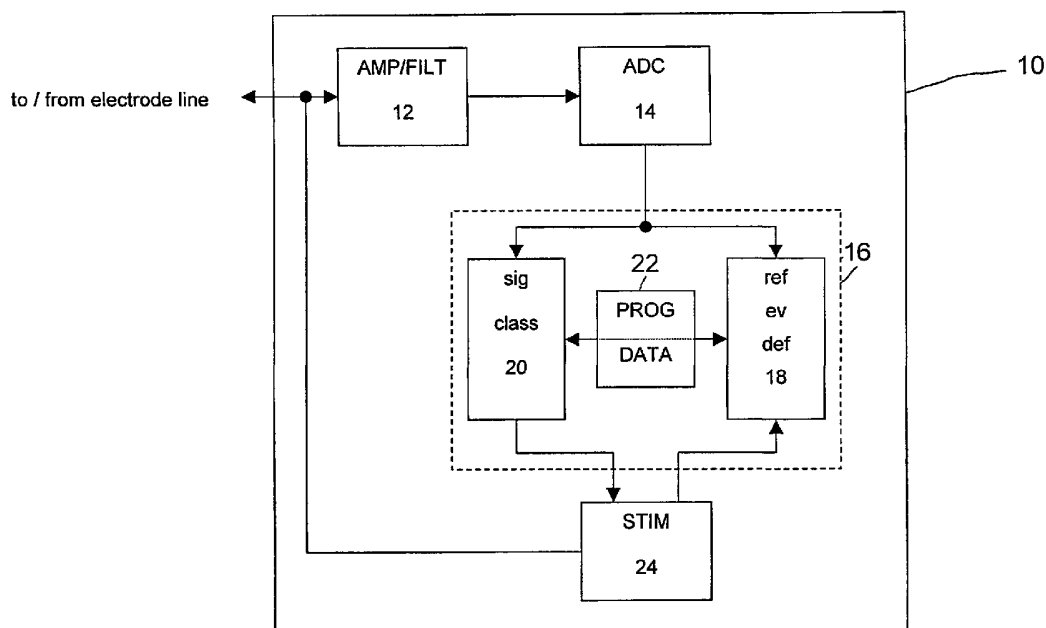
- (51) International Patent Classification⁷: **A61N 1/37**
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Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,

[Continued on next page]

(54) Title: CAPTURE DETECTOR



(57) Abstract: The increased functionality of implantable devices, including pacemakers and defibrillators, makes it necessary to automate tasks such as capture threshold search and signal amplitude measurements in order to relieve the physician of those duties. The invention presents a new approach for the capture threshold detection for atrial as well as ventricular pacing. The suggested algorithm analyzes the change of the signal morphology of the ECG to discriminate between captured and non-captured events. The algorithm comprises two phases, a reference event definition phase and an event classification phase.



CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, 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, ZM, ZW, 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)

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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/EP 03/09520

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61N1/37

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 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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 954 756 A (BLOW BRIAN A ET AL) 21 September 1999 (1999-09-21) the whole document ---	11,12,14
Y	US 2001/049542 A1 (BRADLEY KERRY ET AL) 6 December 2001 (2001-12-06) the whole document ---	11,12,14
A	EP 1 023 919 A (PACESETTER INC) 2 August 2000 (2000-08-02) the whole document ---	11,12,14
A	US 4 766 900 A (CALLAGHAN FRANK J) 30 August 1988 (1988-08-30) the whole document ---	11,12,14
	-/-	



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.

"&" document member of the same patent family

Date of the actual completion of the international search

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17/12/2003

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/09520

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 872 260 A (PACESETTER INC) 21 October 1998 (1998-10-21) the whole document ---	11,12,14
A	US 5 350 410 A (KLEKS JONATHAN A ET AL) 27 September 1994 (1994-09-27) the whole document ---	11,12,14
A	WO 02 058550 A (SHAH DIPEN ;WANG PAUL J (US); BARD INC C R (US); MACADAM DAVID P () 1 August 2002 (2002-08-01) the whole document -----	13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 03/09520

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.: 1-10
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
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:

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.:

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.: 1-10

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

although not explicitly stated, independent method claims 1 and 10 include implicitly the step of generating therapeutical pacing pulses in order to collect ECG data corresponding to paced events. Dependent claim 7 includes explicitly the step of generating therapeutical pacing pulses.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/09520

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