

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference C00019138WO01	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2019/064653	International filing date (<i>day/month/year</i>) 5 December 2019 (05-12-2019)	(Earliest) Priority Date (<i>day/month/year</i>) 6 December 2018 (06-12-2018)
Applicant MEDTRONIC, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- the international application in the language in which it was filed
 a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. **Certain claims were found unsearchable** (See Box No. II)

3. **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- the text is approved as submitted by the applicant
 the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

- as suggested by the applicant
 as selected by this Authority, because the applicant failed to suggest a figure
 as selected by this Authority, because this figure better characterizes the invention

b. none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

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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.:

1-3, 16, 20

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/US2019/064653

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N1/365 A61N1/375
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	US 2018/154154 A1 (SHELDON TODD J [US] ET AL) 7 June 2018 (2018-06-07)	1,16,20
Y	figures 1, 3, 5 paragraph [0028] - paragraph [0033] paragraph [0050] - paragraph [0097] -----	2,3
Y	WO 2018/165289 A1 (CARDIAC PACEMAKERS INC [US]) 13 September 2018 (2018-09-13) paragraph [0061] -----	2,3
A	US 2018/161580 A1 (DEMME WADE M [US] ET AL) 14 June 2018 (2018-06-14) the whole document -----	1-3,16, 20

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 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

21 February 2020

Date of mailing of the international search report

24/06/2020

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/064653

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2018154154	A1	07-06-2018	CN 110022933 A	16-07-2019
			EP 3548141 A1	09-10-2019
			US 2018154154 A1	07-06-2018
			WO 2018102639 A1	07-06-2018

WO 2018165289	A1	13-09-2018	CN 110573068 A	13-12-2019
			EP 3592220 A1	15-01-2020
			JP 2020511216 A	16-04-2020
			US 2018256059 A1	13-09-2018
			WO 2018165289 A1	13-09-2018

US 2018161580	A1	14-06-2018	CN 110072592 A	30-07-2019
			EP 3554629 A1	23-10-2019
			US 2018161580 A1	14-06-2018
			US 2019308021 A1	10-10-2019
			WO 2018111993 A1	21-06-2018

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3, 16, 20

A pacemaker configured to determine a median or a distribution of the determined features and to set the atrial event sensing parameter based on the median or a percentile of the distribution.

2. claim: 4

A pacemaker configured to set a non-atrial tracking pacing mode prior to identifying the plurality of ventricular electrical events and to sense the atrial systolic event from the motion signal during an subsequent atrial tracking pacing mode using the atrial event sensing parameter set in the non-atrial tracking pacing mode.

3. claim: 5

A pacemaker configured to determine the feature of the motion signal by determining a maximum amplitude of each one of a plurality of vector signals of an multi-axis motion sensor.

4. claims: 6-9

A pacemaker configured to determine the feature of the motion signal by determining a latest crossing time of a first threshold amplitude by the motion signal during each of the sensing windows.

5. claims: 10-15

A pacemaker configured to set a passive ventricular filling window following each of the plurality of ventricular electrical events.

6. claim: 17

A pacemaker configured to start the determination of the feature of the motion signal during each of the sensing windows after a time delay after receiving a communication signal from another medical device.

7. claims: 18, 19

A pacemaker configured to abort determination of the feature

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

of the motion signal in response to detecting an abort
condition.
