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**Datasheet for the decision
of 5 July 2022**

Case Number: T 1509/18 - 3.2.02

Application Number: 09702094.5

Publication Number: 2252203

IPC: A61B5/042

Language of the proceedings: EN

Title of invention:

A DEVICE AND METHOD FOR THE GEOMETRIC DETERMINATION OF
ELECTRICAL DIPOLE DENSITIES ON THE CARDIAC WALL

Applicant:

Scharf, Christoph

Headword:

Relevant legal provisions:

EPC Art. 84, 63(1)
EPC R. 115(2)
RPBA 2020 Art. 15(3), 15(6)

Keyword:

Claims - clarity (no)
Summons to oral proceedings - non-attendance of party
Oral proceedings - held in absence of appellant

Decisions cited:

T 0728/98

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1509/18 - 3.2.02

D E C I S I O N
of Technical Board of Appeal 3.2.02
of 5 July 2022

Appellant: Scharf, Christoph
(Applicant) Im Gugger 4
8810 Horgen (CH)

Representative: Bittner, Bernhard
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 16 January 2018
refusing European patent application No.
09702094.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman M. Alvazzi Delfrate
Members: A. Martinez Möller
C. Schmidt

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division refusing European patent application No. 09 702 094.5. The examining division found that all the requests then on file lacked an inventive step.

II. With a communication dated 26 January 2022, the board summoned the appellant to oral proceedings to take place on 5 July 2022. In a communication under Art. 15(1) RPBA 2020 dated 1 April 2022, the board stated that its preliminary opinion was that all the requests on file lacked both clarity and inventive step. In a communication dated 16 May 2022, the board invited the appellant to state whether it requested that the oral proceedings be held by videoconference.

In a submission dated 31 May 2022, the appellant explained why it disagreed with the board's preliminary opinion. In a further submission dated 8 June 2022, the appellant's representative stated that he would attend the oral proceedings in person.

III. Oral proceedings before the board took place on 5 July 2022.

Nobody appeared for the appellant.

IV. In the written appeal proceedings, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or, as an auxiliary measure, on the basis of one of the first to fourth auxiliary requests, all of which had been filed with a letter dated 6 November 2017.

V. Claim 1 of the main request reads as follows:

"A device for creating a database of dipole densities $d(y)$ at the surface of one or more cardiac chambers of a patient, said device comprising:

a first receiver configured to receive mapping information from a three-dimensional array of electrodes located on one or more catheters, the mapping information received when the three-dimensional array of electrodes are placed in the one or more cardiac chambers;

a second receiver configured to receive anatomical information from at least one imaging instrument configured to produce a geometrical depiction of the one or more cardiac chambers; and

a dipole density module configured to generate the database of dipole densities $d(y)$, wherein the dipole density module determines a dipole density for individual triangle shaped projections onto the cardiac chamber wall, where each triangle projection at a location y contributes $\omega(x,y)$ times the dipole density $d(y)$ to a potential $V(x)$ at a point x , wherein $\omega(x,y)$ is the solid angle for that triangle projection, wherein:

a) x represents a series of locations within one or more cardiac chambers; and

b) $V(x)$ is a measured potential at point x , said measured potential recorded by the multiple electrodes, and wherein

the dipole density module includes a mathematical processing element that comprises one or more of: a computer; an electronic module; software such as a software computer program; hardware such as microcontroller hardware; and combinations thereof, wherein said triangle projections are sized small

enough that the dipole density for each triangle projection is substantially constant."

- VI. Compared to claim 1 of the main request, claim 1 of the **first auxiliary request** further includes the following feature added to the end of the claim:

", wherein the solid angle is the angle subtended by a triangle on the heart wall at the position x of observation, and wherein when viewed from location x , straight lines are drawn from point x to the boundaries of the triangle, and a sphere is constructed of radius $r = 1$ with center of x , wherein the straight lines define the spherical triangle on the surface of the sphere, and wherein the solid angle is proportional to the surface area of the projection of that object onto a sphere centered at the point x "

- VII. Compared to claim 1 of the first auxiliary request, claim 1 of the **second auxiliary request** further includes the following feature added to the end of the claim:

", and wherein the number of triangles determined by dipole density module is based on the size of the heart chamber"

- VIII. Compared to claim 1 of the second auxiliary request, claim 1 of the **third auxiliary request** further includes the following feature added to the end of the claim:

", and wherein he [sic] dipole density $d(y)$ at many equally distributed regions y on the cardiac wall is calculated by solving a linear equation system"

IX. Compared to claim 1 of the third auxiliary request, claim 1 of the **fourth auxiliary request** further includes the following feature added to the end of the claim:

" , and wherein the device comprises at least one display configured to present the dipole densities results from the database of the dipole densities in a visual, anatomical format, such as depicting the dipole densities on a geometric image of the cardiac wall in relation to time (t) by a monitor, so that this format allows a clinician, such as an electrophysiologist, to determine the activation sequence on the cardiac wall, such as to determine treatment locations for a cardiac arrhythmia"

X. The appellant's arguments, where these are relevant to the present decision, can be summarised as follows.

Clarity

Characterising the dipole densities of the triangle-shaped projections as being "substantially constant" was merely a recognition that in real-world scenarios the dipole densities would not be exactly constant. It was a mathematical assumption employed to simplify the calculations. It was well understood that the smaller the triangles, the closer to constant the dipole densities would be. Hence, the feature did not result in a lack of clarity.

Reasons for the Decision

1. The invention

Cardiac arrhythmia such as atrial fibrillation is caused by electrical conduction abnormalities in the cardiac chambers such as the atria.

During each cardiac cycle, the cardiac cells can be viewed as varying electrical dipoles consisting of ion charges on both sides of biological membranes such as the cell membrane.

Systems used to localise the origin of arrhythmias measure and localise potentials on a three-dimensional representation of the cardiac chamber wall. This is typically achieved by using a multiple-electrode intracardiac mapping catheter which simultaneously measures potentials at different points in the cardiac chamber. This can be achieved by non-contact mapping, in which the electrodes do not necessarily have direct wall contact.

The potential measured by each electrode can be seen as the superposition of the potentials arising at the electrode's location from each of the dipoles of the cardiac cells. Once the geometry of the cardiac chamber and the location of each electrode are known, the measured potentials from non-contact mapping can be converted with computer programs and extrapolated into electrograms projected on the heart chamber. This provides information on the regional cardiac electrical activity and, by performing it repeatedly over the cardiac cycle, may be used to determine an activation map reflecting the electrical activation sequence on the cardiac wall. This information supports the

diagnosis and treatment of cardiac diseases such as atrial fibrillation.

Independent claim 1 is directed to a device for creating a database of dipole densities at the surface of one or more cardiac chambers of a patient. The device comprises a first receiver configured to receive mapping information from a three-dimensional array of electrodes, a second receiver configured to receive anatomical information from at least one imaging instrument and a dipole density module. The dipole density module is configured to generate the database of dipole densities, determining a dipole density for individual triangle-shaped projections onto the cardiac chamber wall.

2. Main request - Clarity

2.1 The last feature of claim 1 reads as follows:

"wherein said triangle projections are sized small enough that the dipole density for each triangle projection is substantially constant"

2.2 The appellant submitted that in real-world scenarios the dipole densities within a triangle projection would not be exactly constant, and that using smaller triangles would result in the dipole densities in the triangle projections being closer to constant. The board has no reason to doubt this, and is able to understand the concepts underlying the feature. However, this is not the issue at stake here.

2.3 The claims define the matter for which protection is sought in terms of the technical features of the invention (Article 84 EPC and Rule 43(1) EPC). The

wording used in a claim must satisfy this requirement by enabling the scope of protection to be delimited without leaving any doubt as to which subject-matter is covered and which is not (see also point 3 of the Reasons of T 728/98, OJ 2001, 319).

In that regard, the board notes that the appellant has submitted that the small sizing of the triangle projections constituted a distinguishing feature over D1 (EP 1 166 714 A1), and that the inventive step was also based on this point (see appellant's submission dated 31 May 2022, page 14, last but one paragraph to page 15, third paragraph).

- 2.4 Wording which may be appropriate in another context, for example to indicate a mathematical assumption employed to simplify calculations when modelling a complex system, is not necessarily appropriate in a claim in order to delimit the matter for which protection is sought.
- 2.5 In the case at hand, the feature in claim 1 is not presented as a mathematical assumption - which would not as such limit a device - but instead refers to the configuration of the dipole density module for generating a database of dipole densities. The dipole density module according to claim 1 determines a dipole density for individual triangle-shaped projections. The last feature then specifies that said triangle projections are "sized small enough that the dipole density for each triangle projection is substantially constant", thereby defining the module's configuration for generating a database of dipole densities for a specific sizing of the triangle projections.

2.6 There is no general definition of what a "substantially constant" dipole density is. Nor does claim 1 provide a quantitative definition for this expression. Hence, it is not possible to establish whether a prior-art device with a module using triangle projections of a size resulting in a certain variation of the dipole density within each triangle projection (for example 0.1%, 1%, 20%) is to be regarded as falling within the scope of protection defined by the claim. The scope of protection is thus not delimited without leaving any doubt.

2.7 It follows that claim 1 is not clear (Article 84 EPC). The main request is thus not allowable.

3. Auxiliary requests

Claim 1 of each of the first to fourth auxiliary requests comprises the same feature, resulting in the same lack of clarity. Hence, the first to fourth auxiliary requests are likewise not allowable.

4. Other issues

The board's preliminary opinion was that claim 1 of each of the requests on file was neither clear (Article 84 EPC) nor involved an inventive step within the meaning of Article 56 EPC.

Since lack of compliance with a single requirement of the EPC results in a request not being allowable, and since all the requests were found not to comply with the requirements of Article 84 EPC, there is no need to establish whether the subject-matter of claim 1 of each of the requests involves an inventive step.

5. Non-appearance at oral proceedings before the board

The board duly summoned the appellant to the oral proceedings. However, in contradiction of the appellant's submission dated 8 June 2022 announcing its intention to attend in person, nobody appeared for the appellant at the oral proceedings.

According to Rule 115(2) EPC, oral proceedings may continue in the absence of a duly summoned party who does not appear. According to Article 15(3) RPBA 2020, the board is not obliged to delay any step in the proceedings, including its decision, by reason only of the absence at the oral proceedings of a party duly summoned, who may then be treated as relying only on its written case.

The board thus held the oral proceedings in the absence of the appellant and treated the appellant as relying only on its written case. In view of the conclusions above, the board was in a position to announce the decision at the conclusion of the oral proceedings (Article 15(6) RPBA 2020).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



D. Hampe

M. Alvazzi Delfrate

Decision electronically authenticated