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**Datasheet for the decision
of 29 April 2024**

Case Number: T 1976/22 - 3.4.01

Application Number: 14829866.4

Publication Number: 3024541

IPC: A61N1/36

Language of the proceedings: EN

Title of invention:

OPTIMISED CHANNEL CONFIGURATION BASED ON SPATIAL PROFILES

Applicant:

Med-El Elektromedizinische Geräte GmbH

Headword:

Electrode stimulation in cochlear implants / Med-El

Relevant legal provisions:

EPC 1973 Art. 123(2), 84, 113(1)

RPBA 2020 Art. 12(3), 12(4), 12(6), 12(8)

Keyword:

Main request, first auxiliary request - added subject-matter - not allowable

First auxiliary requests - not clear - not allowable

Second to sixth auxiliary requests - not admitted - should have been filed earlier or were no longer maintained in first instance proceedings

Immediate decision possible - right to be heard respected

Decisions cited:

T 0129/13, T 1974/16, T 1780/17, T 0990/21



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1976/22 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 29 April 2024

Appellant: Med-El Elektromedizinische Geräte GmbH
(Applicant) Fürstenweg 77
6020 Innsbruck (AT)

Representative: Downing, Michael Philip
Downing IP Limited
Grosvenor House
7 Horseshoe Crescent
Beaconsfield, Bucks. HP9 1LJ (GB)

Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 21 March 2022
refusing European patent application No.
14829866.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair P. Scriven
Members: T. Petelski
R. Winkelhofer

Summary of Facts and Submissions

- I. The appeal is of the Examining Division's decision to refuse the application, on the grounds that the subject-matter of claim 1 of each of the then main request and first and second auxiliary requests extended beyond the content of the application as filed, and claim 1 of the then second auxiliary request lacked clarity.
- II. The appellant requests that the decision be set aside and that a patent be granted on the basis of a main request or else one of six auxiliary requests.
- III. The main and first auxiliary requests are the same as the first and second auxiliary requests underlying the decision. The second to sixth auxiliary requests are the same as earlier requests - some with and some without clarifying or editorial modifications - that had been withdrawn.
- IV. Claim 1 of the main request reads (reference signs deleted):

A cochlear implant arrangement comprising:

an implant electrode having a plurality of electrode contacts for delivering electrode stimulation signals to adjacent neural tissue, for a defined frequency band

reflecting tonotopic organization of the cochlea; and

an implantable stimulation processor coupled to the implant electrode, for producing the electrode stimulation signals;

characterised in that the stimulation processor is adapted to deactivate at least one of the electrode contacts according to an electrode masking function which

i. calculates current amplitudes for each electrode contact based on long term average spectra data;

ii. identifies an electrode contact which is masked by an adjacent electrode contact when both are stimulated by those current amplitudes; and

iii. excludes at least one of the electrode contacts to avoid delivering electrode stimulation signals to an electrode contact masked by an adjacent electrode contact.

- V. Claim 1 of the first auxiliary request differs in the following marked amendments of the characterizing part (reference signs deleted):

... characterised in that the stimulation processor is adapted to deactivate at least one of the electrode contacts according to an electrode masking function ~~which~~

wherein the electrode masking function is determined by

i. calculating ... ;

ii. identifying ... ; and

iii. excluding

VI. Claim 1 of the second auxiliary request is based on claim 1 as originally filed, and differs from it in the marked amendments (reference signs deleted):

A cochlear implant arrangement comprising:

an implant electrode having a plurality of electrode contacts for delivering to adjacent neural tissue electrode stimulation signals for a defined frequency band reflecting tonotopic organization of the cochlea; and

an implantable stimulation processor coupled to the implant electrode for producing the electrode stimulation signals;

wherein characterised in that the implantable stimulation processor is adapted to deactivate at least one of the electrode contacts ~~is deactivated~~ based on ~~current spread overlap~~ and an electrode masking function derived using ~~of~~ long term average spectra data and current spread overlap to avoid delivering electrode

stimulation signals to an electrode contact masked by an adjacent electrode contact.

VII. Claim 1 of the third auxiliary request is also based on claim 1 as originally filed, and differs from it in its characterizing part (amendments marked; reference signs deleted):

... ~~wherein~~ characterised in that the stimulation processor is adapted to deactivate at least one of the electrode contacts is deactivated according to an electrode masking function based on at least;

i. current spread overlap of spatial current spreads based on an exponential spread decay of different intensity on adjacent electrode contacts, and

ii. ~~an electrode masking function based on long term average spectra data derived based on logarithmizing frequency-band dependent average stimulation amplitudes~~

*—
to avoid delivering electrode stimulation signals to an electrode contact masked by an adjacent electrode contact.*

VIII. Claim 1 of the fourth auxiliary request is also based on claim 1 as originally filed, and differs from it in its characterizing part (amendments marked; reference signs deleted):

... ~~wherein~~ characterised in that at least one of the electrode contacts is deactivated by the stimulation processor according to an electrode masking function based on current spread overlap of spatial current spreads based on an exponential spread decay of different intensity on adjacent electrode contacts and ~~an electrode masking function of long term average spectra data~~ derived based on logarithmizing frequency-band dependent average stimulation amplitudes to avoid delivering electrode stimulation signals to an electrode contact masked by an adjacent electrode contact

- IX. Claim 1 of the fifth auxiliary request is also based on claim 1 as originally filed, and differs from it in its characterizing part (amendments marked; reference signs deleted):

... ~~wherein~~ characterised in that at least one of the electrode contacts is deactivated based on current spread overlap and an electrode masking function of long term average spectra data to avoid delivering electrode stimulation signals to an electrode contact masked by an adjacent electrode contact.

- X. Claim 1 of the sixth auxiliary request is also based on claim as originally filed, and differs from it in the marked amendments (reference signs deleted):

A cochlear implant arrangement comprising:

an implant electrode having a plurality of electrode contacts for delivering electrode stimulation signals to adjacent neural tissue, ~~electrode stimulation signals~~ for a defined frequency band reflecting tonotopic organization of the cochlea; and

an implantable stimulation processor coupled to the implant electrode, for producing the electrode stimulation signals for a subset of the electrode contacts;

wherein at least one of the electrode contacts is ~~deactivated~~ excluded from the subset based on:

- determining band-filter centre frequencies for the electrode contacts

- calculating long-term sound processor amplitudes for those frequencies

- calculating normalised amplitudes

- calculating an electrode separation vector for the electrode contacts

- calculating a normalised absolute difference for adjacent electrodes

- identifying the largest such difference, and

- excluding the at least one electrode from the subset, identified as the electrode at or adjacent the largest such difference

~~current spread overlap and an electrode masking function of long term average spectra data to avoid delivering electrode stimulation signals to an electrode contact masked by an adjacent electrode contact.~~

XI. The appellant has not requested oral proceedings.

Reasons for the Decision

Content of the application

1. The invention is in the field of cochlear implants used as hearing aids. Multiple electrodes, arranged along the spiral cone of the cochlea, stimulate the acoustic nerve. The frequency band used for each electrode reflects the natural frequency distribution along the cochlea (published application: [0001], [0002], [0006]). It may happen that channel interactions cause the stimulation signals of some electrodes to be masked by the signals from neighbouring electrodes. The invention addresses this problem by using average spectra of sound or speech and information on current decay within the tissue between electrodes to calculate the expected amount of masking. The result of the calculation allows identification of those electrodes which are excessively masked, or which cause excessive

masking, and their selective deactivation ([0011] - [0015], together with the detailed embodiments). The distribution of the stimulation signals is adapted to the reduced number of electrodes.

Main request - added subject-matter

2. The Examining Division found, under point 15.4 of the decision, and with reference to points 14.4 to 14.6, that the subject-matter of claim 1 of the then first auxiliary request extended beyond the application as filed. This was because the latter, and in particular paragraphs [0011], [0023], [0027], [0044], and [0046], did not provide a basis for a stimulation processor programmed to obey an electrode masking function, this function performing step i of calculating current amplitudes, step ii of identifying a masked electrode contact, and step iii of excluding at least one masked electrode contact.
3. The appellant argues that the scope of the amended claims was based on the claims as filed and as understood in the light of the description, in particular of paragraphs [0007], [0023], [0024], [0027], and [0028], and Figures 3 and 5. The steps i to iii of calculating, identifying, and excluding were explanations of how the skilled person understood the description, even if they were not literally disclosed.
4. Paragraph [0013] of the published application says that

... the stimulation processor may use the electrode masking function to dynamically deactivate at least one of the electrode contacts.

5. This means that the appellant is correct in that the application, at least implicitly, discloses that the stimulation processor is programmed to use an electrode masking function. The application also discloses, partly in the paragraphs cited by the appellant, the determination of an electrode masking function, the calculation of current amplitudes, the identification of certain electrodes, and the exclusion of some of them.
6. However, as will be shown, the electrode masking function disclosed in the published application is different from the one defined in claim 1. Further, regardless of the definition of the electrode masking function, some of the steps defined in claim 1 are not disclosed in the general terms in which they are defined in the claim.
7. In claim 1, the expression "function" is used in the sense of a functionality of the implant and its stimulation processor, which is realized by a program that causes the processor to execute a series of method steps i to iii. The deactivation of electrode contacts in step iii is part of this functionality.
8. The application as filed, in contrast, uses "function" in the mathematical sense of assigning a function value, which might be a masking value, to a variable, which might be an electrode contact or a pair of electrode contact locations, dependent on parameters like current amplitudes and electrode distance, or the resulting current decay between the pair of electrode contact locations. According to paragraph [0009]:

In general, the amount of masking between electrode contacts is a function of their spatial distance and current amplitude.

9. The (mathematical) electrode masking function is generated and used as a tool during the execution of a program in one or more of its execution steps, in order to generate results that allow the selection of electrode contacts to be deactivated. However, the function is not responsible for (or capable of) executing the steps by itself.
10. This different definition of the electrode masking function results in differences between steps i to iii of claim 1 and the application as filed, though the differences even go beyond the different definition.

Step i

11. According to step i of claim 1, the electrode masking function calculates current amplitudes for each electrode contact.
12. Paragraph [0012] of the published application, however, says that the electrode masking function can make use of (previously-obtained) average current amplitudes. These are average amplitudes, not amplitudes themselves, and the electrode masking function does not calculate them.
13. The way in which the average current amplitudes are used by the electrode masking function, in particular for its derivation, is explained in more detail in the particular embodiment illustrated in Figure 3, which assumes the same current decay for each electrode

contact ([0029]). After the average has been calculated in step 304,

... the electrode masking function can be derived based on logarithmizing the frequency-band dependent average stimulation amplitudes A_i , step 305, for example, relative to the maximum occurring amplitude as in Equation 1 ...

14. In the embodiment illustrated by Figure 5, different current decays for the electrode contacts are assumed ([0036]). According to [0038] and Equation 5, the electrode masking function is based on the (previously determined) average current amplitudes A , similar to the embodiment of Figure 3. However, in difference to the latter, a matrix is determined for the calculation ([0038]):

Alternatively, the electrode masking function can be based on using the current decay constants α and β to create a stimulation distribution matrix AA ($M \times M$), step 505, ...

15. The matrix elements (see Equation 5) represent the contributions to the average stimulation (current) amplitudes of the various electrodes at each electrode location. This matrix is normalised and "logarithmized" to produce a "masking" matrix ([0039], Equation 6).

16. Hence, the application as filed does not disclose an electrode masking function that calculates current amplitudes as defined in step i. Rather, a step of calculating average current amplitudes is performed by a program running on the stimulation processor. In a

later step, the calculated average current amplitudes are then used to derive the electrode masking function.

Step ii

17. According to step ii, the electrode masking function identifies a masked electrode contact.
18. As explained above, the published application only says that the electrode masking function is derived and used in steps preceding the identification. The identification is performed by a program running on the stimulation processor, but not by the electrode masking function.
19. Regardless of which entity performs the identification, the published application does not describe step ii of claim 1 in this generality at all. Rather, most - if not all - electrode contacts are masked to some extent by their neighbours (see Figure 2). Consequently, it is not the masked electrode contacts that are identified, but the "excessively masked or masking electrode contacts", meaning those involved in masking that exceeds some threshold ([0032]: step 309 in Figure 3; [0041]: step 508 in Figure 5; for the identification of masking and masked electrode contacts, see also [0024]).
20. Hence, the application as filed does not disclose an identification of a masked electrode contact in the general terms of step ii of claim 1. Rather, excessively masked or masking electrodes are identified, by comparing the amount of masking with a threshold.

Step iii

21. According to step iii, the electrode masking function excludes at least one of the electrode contacts. At least one contact is excluded and it is not necessarily the one identified in step ii.
22. Again, as in steps i and ii, according to the application as filed, it is not a (mathematical) electrode masking function that excludes electrode contacts.
23. In fact, the application as filed does not disclose any entity at all that performs step iii of claim 1, in the generality in which it is claimed. A deactivation (or exclusion from stimulation) of electrode contacts is only disclosed as being based on both the current spread overlap and the electrode masking function ([0011]; see also [0013] - [0015], [0023], and original claim 1):

... at least one of the electrode contacts is deactivated based on current spread overlap and an electrode masking function ...
24. In the particular embodiments illustrated by Figures 3 and 5, the deactivation of electrode contacts is based on the electrode masking function and current spread overlap (or the current decay from one electrode to the next; see paragraphs [0025], [0029], [0030], as well as [0036], [0038]). In addition, if an identification of electrode contacts is performed, as in steps 309 and 508, it is always one of the identified electrode contacts that is deactivated in the later steps 312, 313, 512, 513 (see also paragraph [0024]).

25. Hence, a deactivation of an electrode contact that was not previously identified as excessively masked or masking, and a deactivation based on information that does not include the electrode masking function and current spread overlap, is not originally disclosed.

Conclusion

26. The Examining Division was correct in finding that the subject-matter of claim 1 of the main request (then first auxiliary request) extends beyond the content of the application as filed (Article 123(2) EPC).
27. The main request is, therefore, not allowable.

First auxiliary request - allowability

28. Claim 1 differs from that of the main request in that the electrode masking function is no longer defined as executing steps i to iii, but as being "determined by" executing these steps.
29. Regardless of whether this definition affects the nature of the electrode masking function, that is whether it is a functionality of the stimulation processor or a mathematical function, such a definition is not originally disclosed. This follows from the findings on the main request. It also follows from these findings that steps ii and iii, irrespective of their relationship to an electrode masking function, are not originally disclosed in the general terms in which they are defined in claim 1.

30. Regarding added subject-matter, the appellant only referred to the arguments they put forward in relation to the main request.
31. Hence, the Examining Division's finding (on the then second auxiliary request) was correct in that the subject-matter of claim 1 extends beyond the content of the application as filed (Article 123(2) EPC), the reasons being similar to those for the main request.
32. The Examining Division also found that the amended text was unclear with regard to the technical limitations to the cochlear implant.
33. According to the appellant, the claim as a whole made it clear that the stimulation processor of the cochlear implant arrangement operated under the control of the electrode masking function. Therefore, the operating system of the stimulation processor was a technical feature which restricted the claimed cochlear implant.
34. However, the appellant's argument does not address the crucial point. It is correct that the claim implies that the stimulation processor contains and runs a program for deactivating electrode contacts according to an electrode masking function. This is, indeed, a certain restriction on the implant. However, the problem lies in that the claim leaves open where the program for determining the masking function according to steps i to iii is stored, and where these steps are carried out. As will be explained, this leads to an ambiguity.
35. The amended feature defines that the "stimulation processor is adapted to deactivate at least one of the electrode contacts according to an electrode masking

function, wherein the electrode masking function is determined by" steps i, ii, and iii.

36. On the one hand, this could mean that the determination of the electrode masking function, in the sense of a mathematical function that assigns an exclusion or non-exclusion value to each electrode contact, is performed separately from the cochlear implant. For example, by mathematically determining the electrode masking function on an external computer prior to the programming of the stimulation processor, such that the processor can store and use the completely determined electrode masking function to deactivate those electrodes that are assigned an exclusion. In this understanding, steps i, ii, and iii of determining the function do not restrict the implant and its processor at all.
37. On the other hand, the amended feature could also mean that the stimulation processor deactivates the electrode according to an electrode masking function in the sense of a functionality, such that the stimulation processor comprises a program with the functionality of carrying out steps i to iii. In this case, steps i, ii, and iii are stored on the stimulation processor and do restrict the respective implant.
38. Due to the ambiguity, the Examining Division was also correct in finding that claim 1 was not clear (Article 84 EPC).
39. Hence, the first auxiliary request is not allowable for extension beyond the application as filed and for lack of clarity.

Further auxiliary requests - consideration

40. There are procedural and substantive reasons for not considering the second to sixth auxiliary requests.

41. The procedural reasons are:

(a) The claims of the second, fifth, and sixth auxiliary requests are amended versions of the originally filed claims. These requests are new on appeal and their admission is subject to the Board's discretion under Article 12(4) RPBA. Article 12(4) RPBA requires the appellant to provide reasons for submitting a new request in appeal proceedings. In the grounds of appeal, the appellant did not provide any such reasons why these requests were only filed on appeal, but only stated that they sought to express the invention in a wording that was clear and based on the application as filed. That, however, is not a reason why they could not have been filed earlier. There is also no other apparent reason that might justify their late filing, in particular in view of the issues of added subject-matter and clarity that were discussed throughout the examination proceedings, when the appellant had several opportunities of amending the claims.

(b) The claims of the third and fourth auxiliary requests are identical to claims filed during examination proceedings, which were subsequently replaced by requests based on other claims. According to Article 12(6) RPBA, requests that were no longer maintained in the first instance proceedings shall not be admitted, "unless the circumstances of the appeal case justify their

admittance." The appellant has not argued for such circumstances, nor are any apparent from the case history.

42. The substantive reasons are:

- (a) In the search opinion, the Search Division found, amongst other things, that the claims as originally filed lacked clarity.

First, because it was not clear, from the last feature of claim 1, what technical limitations of the cochlear implant were intended by the deactivation feature. In other words, whether it was an entity of the cochlear implant that was configured (e.g., programmed) to execute the deactivation, or some other entity, or whether the deactivation was performed manually.

Second, because the terms "current spread overlap" and "electrode masking function of long term average spectra data" were insufficiently defined to be understood.

The appellant's argument according to which the description was to be consulted is not persuasive, because it is the claims that must define the matter for which protection is sought, and the delimitation of this matter must be clear from the claims themselves (see T 129/13, Reasons 3.2 and 3.5; see also Case Law of the Boards of Appeal, 10th edition, II.A.3.1). This, however, is not the case in the present application. Furthermore, not even the description provides a clear definition of those terms.

In view of that, the first objection, prima facie, applies to claim 1 of each of the fifth and sixth auxiliary requests, and the second objection to claim 1 of each of the second and fifth auxiliary requests.

- (b) During examination proceedings, the Examining Division found that claim 1 of each of the present third and fourth auxiliary requests lacked clarity.

First, because it was not clear whether it was the deactivation or the electrode masking function that was "based on" current spread overlap and long term average spectra data.

Second, because it was not clear how the electrode masking function was used, i.e., whether it was derived, input, or evaluated; and whether it was an entity of the cochlear implant that was configured (e.g., programmed) to derive the function, or whether the function was derived on an external entity and merely used by the stimulation processor in some unclear way.

Third, because the definition of the electrode masking function was unclear in that neither its input nor its output was defined, and the terms used to explain it were neither known terms in the art nor defined in a comprehensible manner in the claim.

In the grounds of appeal, the appellant merely referred to the arguments they had submitted when filing the respective claims. However, they did not argue why the objections that were subsequently

raised against them by the Examining Division did not apply.

The Examining Division's clarity objections are, *prima facie*, persuasive and still apply to claim 1 of each of the present third and fourth auxiliary requests.

- (c) The Examining Division also found that the subject-matter of claim 1 of the present third auxiliary request extended beyond the content of the application as filed. The latter did not disclose an electrode masking function that was based on "current spread overlap" and "long term average spectra data". Rather, it disclosed that the deactivation was based on "current spread overlap and an electrode masking function of long-term average spectra data" ([0011]), which was something else.

This objection also applies to claim 1 of the present fourth auxiliary request.

Again, the appellant merely referred to the arguments they had submitted when filing the respective claims, but did not argue why the objections that were subsequently raised against them by the Examining Division did not apply.

Also this objection is, *prima facie*, persuasive and applies to claim 1 of each of the present third and fourth auxiliary requests.

- (d) None of the second to sixth auxiliary requests is an attempt to overcome the Examining Division's objections by a convergent development of the

claims of the main and first auxiliary request, for example by adding features in order further to define the electrode masking function and its use in the deactivation according to steps i to iii. Instead, the second and fifth auxiliary request go back to versions of claim 1 that are almost identical to the original wording, and the third and fourth auxiliary requests revive abandoned claim versions with identical wording, none of which comprises steps i to iii of the first auxiliary request. The sixth auxiliary request goes in a completely different direction again. Hence, there is also a lack of convergence, which increases procedural complexity.

43. It is the appellant's general intention to overcome the Examining Division's objections to the claims underlying the decision by going back to previous claim versions and amended versions of them.

44. However, the appeal proceedings are not an opportunity to start the examination afresh, and to go through the previous claim evolution for a second time, in parts by choosing a different direction. During examination proceedings, the appellant had the opportunity to amend the claims several times, and they now have the opportunity to have the decision of the Examining Division on the underlying claim versions reviewed by the Board. And although claim requests filed on appeal might well be considered under certain conditions, neither the procedural circumstances nor the content of the present second to sixth auxiliary requests justifies their consideration under Article 12(4) or 12(6) RPBA.

Right to be heard

45. Article 12(8) RPBA states that "the Board may decide the case at any time after filing of the statement of grounds of appeal". This is subject to the right to be heard and to oral proceedings (Articles 113 and 116 EPC).
46. As the appellant did not request oral proceedings, and the Board does not consider it expedient that oral proceedings should be held, Article 116 EPC is not engaged.
47. The appellant's rights under Article 113 EPC are fully respected, in the present case, by a decision issued on the basis of the appealed decision and the statement of grounds of appeal.
48. The main request and first auxiliary requests are to be rejected because, in the light of the appealed decision and the appellant's submissions, the Examining Division was right to find them unallowable.
49. The second to sixth auxiliary requests are not considered.
50. An appellant who submits new requests on appeal must set out, in their statement of grounds, whatever submissions they have on the issue of their consideration, at least in outline (Article 12(4) RPBA, second paragraph). Indeed, they must set out their whole case (Article 12(3) RPBA). The Board may, then, take the statement of grounds as stating the complete case, including as to the consideration of the new requests. Provided that the Board does not introduce new issues, it may thus exercise its discretion to

consider new requests in accordance, *inter alia*, with the criteria set out in the last paragraph of Article 12(4) RPBA.

51. In this case, the decision as to the consideration of the second to sixth auxiliary requests is based on the requests themselves, the appellant's submissions in the statement of grounds, and the history of those requests in the proceedings before the Search and Examining Divisions. Those are all issues that the appellant has had ample opportunity of commenting upon.
52. In view of that, an immediate decision can be issued in writing.
53. For similar reasons as in the present case, the Boards issued an immediate decision in cases T 1974/16 (Reasons 1, 4.1, 4.6), T 990/21 (Reasons 1, 5.1, 5.3), and T 1780/17 (Reasons 2.3), in which auxiliary requests filed during the appeal proceedings were not admitted, without the Board previously informing the parties involved of its opinion.

Conclusion

54. The main request is not allowable, because the subject-matter of claim 1 extends beyond the content of the application as filed.
55. The first auxiliary request is not allowable, because the subject-matter of claim 1 extends beyond the content of the application as filed, and because claim 1 is not clear.

56. The second to sixth auxiliary requests cannot be considered for the reasons set out above, not the least because they are, *prima facie*, not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



D. Meyfarth

P. Scriven

Decision electronically authenticated