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D E C I S I O N
of 7 September 2004

Case Number: T 1126/01 - 3.2.2

Application Number: 93923860.6

Publication Number: 0665728

IPC: A61B 5/04

Language of the proceedings: EN

Title of invention:
Monitor and method for acquiring and processing electrical signals relating to bodily functions

Applicant:
Draeger Medical Systems, Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84
EPC R. 29(1), (3)

Keyword:
"Clarity (no)"
"Missing of essential features"

Decisions cited:
-

Catchword:
-

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Case Number: T 1126/01 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 7 September 2004

Appellant: Draeger Medical Systems, Inc.
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Representative: O'Connell, David Christopher
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 26 April 2001 refusing European application No. 93923860.6 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: T. K. H. Kriner
Members: M. G. Noël
E. J. Dufrasne

Summary of Facts and Submissions

I. European patent application No. 93 923 860.6 (International publication No. WO 94/08507) was refused by the Examining Division essentially under article 123(2) EPC, on the ground that the application as filed did not provide a sufficient basis for the submitted amendments, and additionally among other things under Article 84 EPC, on the ground that the subject-matter of the independent claims then on file was not clearly defined, since essential features were missing in these claims.

II. The appellant (applicant) lodged an appeal against this decision on 19 June 2001. Its statement of grounds, received on 30 August 2001, was accompanied with amended sets of claims. The fee for the appeal was paid on 18 June 2001.

III. By a communication of the Board sent on 17 March 2004 the appellant was informed that the submitted sets of claims still lacked adequate support with respect to clarity, in particular as the main claims did not contain all the features essential to the solution.

IV. With a reply dated 4 August 2004, the appellant submitted, again, new sets of claims according to a main and an auxiliary request.

It requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed with his letter of 4 August 2004 or, in the alternative, on the basis of the auxiliary request filed on the same date.

V. Following a telephone talk between the appellant and a member of the Board, the appellant was informed by fax dated 6 August 2004, that the amendments submitted on 4 August 2004 did not appear to be immediately allowable with respect to articles 84 and 123(2) EPC so that the discussion on the formal issues would better have to continue at the oral proceedings requested by the appellant.

VI. By letter dated 12 August 2004, the appellant informed the Board that it would not be represented at the oral proceedings.

Oral proceedings were held, as planned and in conformity with rule 71(2) EPC, on 7 September 2004, and resulted in the present decision.

VII. Claim 1 according to the various present requests read as follows:

Main request:

"A monitor (10) for receiving electrical signals with a bandwidth from a living body and processing such signals to obtain information relating to a bodily function or organ, said monitor comprising:
means (14) for acquiring the electrical signals through one or more electrodes connected to the body, said means for acquiring being located within a housing (198) positioned outside the living body and including means (62) for receiving the electrical signals in analog form and converting the signals into a stream of digital signals, said receiving means operating at a

bandwidth above the electrical signal bandwidth to facilitate recovery of signals within said electrical signal bandwidth; and;
means for processing (12) said stream of digital signals, said processing means being separated from analog signal processing:
characterized in that:
said means (12) for processing includes means (122, 124) for filtering said stream of digital signals, said means (12) for processing being located in a housing away from said housing (14) of said acquiring means, said electrical signals being acquired by said acquiring means at a location away from noise associated with said processing means; and
means for detachably connecting (15) said means for acquiring and said means for processing for transmission of said digital signals therebetween."

Auxiliary request:

"A monitor (10) for receiving electrical signals from a living body and processing such signals to obtain information relating to a bodily function or organ, said monitor comprising:
means (14) for acquiring the electrical signals through one or more electrodes connected to the body, said means for acquiring being located in a housing (198) which is electrically shielded and including a means (64) for receiving the electrical signals in analog form and converting the signals into a stream of digital signals;
means (122) for filtering said stream of digital signals to remove noise or isolate signals of interest from said stream of digital signals, said means for

filtering being located in a housing separate from the housing in which said means for acquiring is located; means (15) for connecting said means for acquiring with said means for filtering."

VIII. In its writings the appellant submitted that while not available word-for-word in the application as filed, the amendments to the claims were nevertheless unambiguously derivable therefrom. Further, claim 1 according to any request included all essential features to meet the objective of the present invention, to provide a monitor able to improve the ability to obtain information relating to a bodily function or organ from received electrical signals.

The present invention as claimed was able to achieve this objective by separating the acquiring means from the processing means, thereby enabling acquisition to be performed at a location separate from the noise associated principally with the processing means and by the provision of receiving means within the acquiring means operating at a bandwidth above the electrical signal bandwidth. By so improving the quality of the acquired electrical signals, the ability to detect and flag artefacts in the signal of interest was also inherently improved.

Since the specific technique was detailed and presented in the description as a preferred embodiment, there was no reason to unnecessarily limit the claimed subject-matter with more specific features taken up from the description, in accordance with the "summary of the invention" given on page 2. The requirements of articles 123(2) and 84 EPC were, therefore, satisfied.

The protection from the noisy environment of the processing module was still reinforced in the auxiliary request, in which it was additionally specified that the housing for locating the acquiring means was electrically shielded.

Reasons for the Decision

1. The appeal is admissible.

2. *Clarity of the claims (adequate support)*

2.1 According to article 84, second sentence, the claims shall be clear and concise and be supported by the description. These requirements concerning the form and the content of the claims are further specified in rule 29(1) and (3), which stipulates that an (independent) claim must state the technical and essential features of the invention. Essential features are those which are necessary to the solution of the technical problem as originally presented in the application as filed, i.e. before any reformulation (objective problem) resulting from the comparison of the invention with a state of the art revealed subsequently.

2.2 According to the application as filed (cf. page 2, lines 4 to 10) the principal object of the invention is to provide a monitor for acquiring and processing EEG data which provides improved signal quality. Another object is to provide a monitor that is highly impervious to electrical noise pollution in the

operating room. In prior art systems, it is namely difficult to differentiate the artefacts generated over a wide band from the EEG signal itself (cf. page 1, lines 25 to 32 and page 14, lines 27 to 33).

The solution to the above-mentioned problem is most generally defined on page 2, paragraph "summary of the invention" not only by a separation (implicitly) between a portable data acquisition module and a stationary processing module, but also and mainly by the particular structure and function of the components contained within each of said modules, namely: in the data acquisition module the EEG signals are acquired and converted to an oversampled stream of digital signals by a sigma-delta modulator; in the processing module the signals are then filtered by a decimation filter.

Thus, even when following the general definition of the solution given in the introductory part of the description and well before entering into details of the described embodiment, the invention was presented principally by the use of specific elements such as a sigma-delta modulator capable of converting the EEG signals into an oversampled stream of digital signals and a decimation filter for filtering and downsampling said stream of digital signals.

2.3 In claim 1 of the main request, the provision of means for converting into a stream of digital signals the signals received in analog form by receiving means operating at a bandwidth above the electrical signal bandwidth, as well as the provision of means for filtering said digital means, being located in a

housing away from the housing for locating the acquiring means, are regarded by the Board as not being sufficient for the invention to be defined clearly and completely. The more since most of these features are part of the precharacterising portion of claim 1 and, as such, known per se from the state of the art, as it was also admitted by the appellant (cf. letter of 4 August 2004, page 6, first paragraph).

A formally acceptable claim 1 should have mentioned at least the use of a sigma-delta modulator and a decimation filter, the structural features and functioning of which are then sufficiently detailed in the description of an embodiment, or have incorporated more specific features taken from the dependent claims.

2.4 More specifically, as mentioned in the description of the EEG monitor in relation with the figures, the present invention resides principally in the specific analog-to-digital conversion technique using an oversampling converter comprising a sigma-delta modulator 64 in the acquisition module 14 and an integer digital signal processor 122 in the processing module 12 (cf. figure 5; page 11, lines 25 to 32 and page 12, lines 13 to 14). As further specified in the application (page 14, lines 12 to 16) the use of sigma-delta analog-to-digital conversion techniques allows for improved artifact detection. Because the sigma-delta modulator highly oversamples (16,384 samples per second) the incoming signal, it can be viewed at a greater bandwidth. Since the output of the modulator is a fast signal (oversampled), it contains very small errors for low frequencies and the resulting

converter is inherently linear (page 12, line 32 to page 13, line 1 and page 8, lines 12 to 22).

Not only the modulator 64 but also the decimator 122 (for filtering out the frequencies above 50 Hz and downsampling the digital signals to 128 samples per second) is of importance in achieving an improved noise ratio performance (page 13, lines 4 to 9 and page 8, lines 22 to 24).

The advantage on the reduction of the noise by merely separating the modulator from the decimator is mentioned in the specification only in a second place (page 13, lines 16 to 21) and repeatedly presented through the application as being of lesser importance when compared with the specific design and effects provided by these elements, which also confirm the general definition of the invention set out in the summary (cf. above point 2.2).

2.5 For these reasons, the Board is satisfied that the subject-matter of claim 1 according to the main request does not provide the features which are essential to the solution as presented in the application as filed and, therefore, is not adequately supported by the description, contrary to the requirement of article 84, second sentence, EPC.

2.6 The subject-matter of claim 1 according to the auxiliary request is even broader as it contains less features than the main request. Consequently, it suffers from the same deficiencies as above. The auxiliary request is based on claim 1 as originally filed, supplemented by the fact that the housing for

locating the means for acquiring is electrically shielded. This additional feature is supported by page 19, line 27 of the description. But how efficient these feature may be for the protection of the means for acquiring from the noisy environment, it remains however of minor importance with respect to the above mentioned features presented as essential in the application. Therefore, the requirements of article 84 EPC are not met, either.

3. *Procedural matters*

By deciding not to be represented at the oral proceedings requested by him, despite still pending formal issues pointed out and reiterated by the Board in both the communication of 17 March 2004 and the fax sent following new requests submitted by the appellant on 4 August 2004, the appellant actually waived its right to comment orally and implicitly requested a decision in the state of the file, though oral proceedings were fully appropriate in the present case.

Since the main claims at issue still were not immediately formally allowable, remittal of the case to the first instance for further prosecution on the substantive issues, as suggested by the Board in its communication, was also premature and, therefore, excluded. In these circumstances the application must be refused in its entirety.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The President:

V. Commare T. Kriner