

Internal distribution code:

- (A) [-] Publication in OJ
- (B) [-] To Chairmen and Members
- (C) [-] To Chairmen
- (D) [X] No distribution

**Datasheet for the decision
of 12 April 2021**

Case Number: T 2560/18 - 3.5.03

Application Number: 13178787.1

Publication Number: 2696599

IPC: H04R25/00

Language of the proceedings: EN

Title of invention:

Compression of spaced sources for hearing assistance devices

Patent Proprietor:

Starkey Laboratories, Inc.

Opponents:

GN Hearing A/S / Widex A/S / Oticon A/S

Headword:

Hearing-aid compression/STARKEY

Relevant legal provisions:

EPC Art. 56, 116(1)

EPC R. 103(4) (a)

RPBA 2020 Art. 12(8)

Keyword:

Decision in written proceedings - (yes): cancellation of arranged oral proceedings following the proprietor's withdrawal of the appeal

Inventive step - all requests (no)

Partial reimbursement of the proprietor's appeal fee at 25% - (yes)

Decisions cited:

T 1045/12



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 2560/18 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 12 April 2021

Appellant I:
(Patent Proprietor)

Starkey Laboratories, Inc.
6600 Washington Avenue South
Eden Prairie, MN 55344 (US)

Representative:

Dentons UK and Middle East LLP
One Fleet Place
London EC4M 7WS (GB)

Appellant II:
(Opponents)

GN Hearing A/S / Widex A/S / Oticon A/S
Lautrupbjerg 7
Nymøllevej 6/Kongebakken 9
2750 Ballerup/3450 Lyngby/2765 Smørum (DK)

Representative:

Aera A/S
Gammel Kongevej 60, 18th floor
1850 Frederiksberg C (DK)

Decision under appeal:

**Interlocutory decision of the Opposition
Division of the European Patent Office posted on
20 August 2018 concerning maintenance of the
European Patent No. 2696599 in amended form.**

Composition of the Board:

Chair K. Bengi-Akyürek
Members: K. Peirs
J. Geschwind

Summary of Facts and Submissions

I. The appeals are against the interlocutory decision of the opposition division to maintain the patent according to the proprietor's "second auxiliary request". The proprietor's main request and first auxiliary request were deemed to be not allowable for insufficiency of disclosure (Article 83 EPC). The grounds for opposition invoked by the opponents were those pursuant to Article 100(a), 100(b) and 100(c) EPC.

II. Appellant I (proprietor) requests that

- the decision under appeal be set aside;
- as a **main request**, the opposition be rejected;
- in the alternative, the patent be maintained in amended form according to one of **nine auxiliary requests**.

The **main request** is the same as the main request underlying the decision under appeal. The **fifth to ninth auxiliary requests** correspond to the first, the second, the fourth, the fifth and the sixth auxiliary request, respectively, underlying the decision under appeal. The other auxiliary requests were filed with the statement of grounds of appeal.

In the event that the main request is not allowable, appellant I requested oral proceedings.

III. Appellant II (opponents) requests that the decision under appeal be set aside and that the patent be revoked.

IV. A communication was issued pursuant to Article 15(1) RPBA 2020 including the board's preliminary opinion that the subject-matter of the independent method claim common to all claim requests of appellant I was not inventive (Article 56 EPC), having regard to the following prior-art documents:

E4: EP 2 131 610 A1;

E8: Stone, M. A., and Moore, B. C.: "Effects of spectro-temporal modulation changes produced by multi-channel compression on intelligibility in a competing-speech task", J. Acoust. Soc. Am. 123, pp. 1063-1076, 2008.

V. In response to the board's communication, appellant I withdrew not only their appeal but also their request for oral proceedings. They did not submit any comments on the substance of the board's communication.

VI. Oral proceedings before the board were then cancelled.

VII. Independent method claim 11 of the **main request** (patent as granted) reads as follows:

"A method, comprising:

receiving stereo surround signals from a sound environment;
processing the received signals to isolate individual sound source components;
independently compressing the individual sound source components to prevent cross modulation between waveforms of the source components; and
after compressing the components, applying a head-related transfer function to the compressed individual sound source components."

VIII. Each of the **first to ninth auxiliary requests** comprises an independent method claim which is identical to claim 11 of the main request.

Reasons for the Decision

1. *Decision in written proceedings*

As the board does not consider holding oral proceedings to be expedient or necessary (cf. Article 116(1) EPC), oral proceedings were cancelled and a decision handed down in written proceedings (Article 12(8) RPBA 2020).

Moreover, since appellant I withdrew their appeal before any decision could be announced at oral proceedings, the respective appeal fee is to be reimbursed at 25% under Rule 103(4) (a) EPC.

2. *The opposed patent*

The present invention aims to improve speech intelligibility for a hearing aid in which compression of an audio signal is combined with head-related transfer functions (HRTFs). It does so by applying the HRTFs *prior to* the compression, which is supposed to reduce artificial envelope fluctuations in the signals to be reproduced as sound by the hearing aid.

3. *All claim requests: independent method claim - inventive step*

3.1 All claim requests on file comprise an independent method claim which is identical to independent claim 11 of the patent in suit (cf. points VII and VIII above). This independent method claim comprises the following

limiting features (as labelled by the board):

- (a) a method, comprising:
- (b) receiving stereo surround signals from a sound environment;
- (c) processing the received signals to isolate individual sound source components;
- (d) independently compressing the individual sound source components to prevent cross modulation between waveforms of the source components;
- (e) after compressing the components, applying a head-related transfer function (HRTF) to the compressed individual sound source components.

3.2 Document **E4** is acknowledged to be the most suitable starting point for an inventive-step analysis and discloses **features (a) to (d)** in Figure 6 together with paragraphs [0016] and [0017]. By contrast, E4 does not disclose **feature (e)**: while paragraph [0016] of E4 suggests to apply HRTFs, it is apparent from Figure 6 of E4 that these functions are applied prior to the compression, whereas feature (e) requires the HRTF to be applied after compressing the components.

3.3 The technical effect of applying an HRTF *per se* is to render the sound reproduction dependent on the orientation of the source of a sound with respect to the ear of a listener. The fact that it is applied *after* compressing the source components has, according to paragraph [0019] of the patent in suit, the consequence that the interaural level differences "ILD", which are important components of the HRTF, are neither "compressed" nor "cross modulated".

As addressed in paragraphs [0007] and [0008] of the opposed patent, the term "cross modulation" must be

understood in the sense of **E8**, which sets out in

- page 1063, right column, first full paragraph;
- page 1071, left column, second paragraph;
- page 1074, left column, second full paragraph ("heavy reliance on envelope cues")

and

- the paragraph bridging pages 1074 and 1075

that the term "across-source modulation correlation (ASMC)" is used to describe a factor that contributes to reduced speech intelligibility due to fast-acting compression having a detrimental effect on, amongst others, temporal envelope cues. These cues are relied upon by hearing-impaired people to a greater extent to understand speech.

This means that applying the compression *prior to* applying the HRTF has the technical effect of ensuring that speech intelligibility is not impaired when introducing an orientation-dependent effect in the sound reproduction. It is highlighted in this respect that E4 (cf. paragraphs [0001], [0004] as well as [0016] and [0017]) particularly concerns stereo reproduction via left and right hearing-assistance devices, which places E4 in the same hearing-impaired context as E8.

- 3.4 As a consequence, the objective technical problem should be framed as "how to avoid, in the sound reproduction system of E4, any detrimental effects on speech intelligibility when imparting the source-orientation dependent effect".

Several other objective technical problems have been suggested, but the board does not consider them

appropriate for the following reasons:

- in point 21.2.1 of the reasons of the decision under appeal, the opposition division considered the objective technical problem as being "to provide spatial cues in the left and right output signals", which does not take account of the intended effect that compression and cross-modulation of the ILD (cf. point 3.3 above) are avoided;
- in point 21.2.2 of the reasons of the decision under appeal, the opposition division also regarded the objective technical problem to be simply "to provide an alternative", which the board considers to be too vague;
- in the appeal proceedings, appellant II considered the objective technical problem to be "to prevent interference between sound sources", but this is not related to the fact that an HRTF with the above-mentioned properties is used.

3.5 Document E8 itself suggests a solution to the objective problem as framed in point 3.4 by the board, namely in the paragraph bridging the left and right column of page 1075: for people with a limited ability to use temporal fine structure and with limited frequency resolution, i.e. users of cochlear implants and hearing-aid users with severe to profound hearing loss, the amount and speed of compression as well as the number of compression channels should be limited, so as to avoid loss and distortion of information contained in the patterns of spectral and temporal modulation of speech. The skilled person could adopt this solution when confronted with the objective technical problem stated above and accordingly restrict the compression, irrespective of any application of an HRTF.

The board notes in this respect that E8 is silent about applying an HRTF after compression, because the auditory cues necessary for spatial hearing are already *inherently* present in the incoming signals detected by the hearing aids worn by the test subjects considered in the study in E8: an *additional* application of an HRTF is not necessary. This is in contrast to the stereo reproduction for hearing-impaired users as addressed in E4, where HRTFs can optionally be applied.

3.6 Therefore, the question can be raised whether there are *alternative* solutions to be adopted by the skilled person when confronted with the above objective technical problem. One such alternative solution may be, based on the skilled person's common general knowledge, to swap the HRTF modules and the compression modules in Figure 6 of E4. Given that the HRTF modules are merely optional, their functionality can easily be removed and it would be straightforward for the skilled person to connect the compressors directly with the synthesiser 601.

3.7 To judge whether an inventive step is to be acknowledged, it must be assessed whether the skilled person would consider this alternative solution to be equally likely as the solution presented in E8. The board considers this to be the case in the context of E4 for the following reasons:

The teaching of document E4 starts from Figure 4 as prior art (described in paragraph [0014]), where compression takes place *after* mixing the signals. In the embodiments of Figures 5 and 6 of E4, compression is moved upwards in the processing chain such that it takes place *before* the mixing step in order to avoid "over-attenuation of desired sounds" (see

paragraph [0014] of E4). Confronted with the above objective technical problem, the skilled person would have immediately realised, based on E8, that applying compression after the application of HRTFs as in Figure 6 of E4 affects speech intelligibility. One of the options available to the skilled person would therefore be to adopt the solution already considered in E4 when moving from Figure 4 to Figures 5 and 6, namely moving the compression module upwards in the underlying processing chain.

Hence, the subject-matter of the independent method claim merely results in an obvious and consequently non-inventive selection among a number of known and equally likely possibilities (see e.g. T 1045/12, Reasons 4.7.7).

3.8 In conclusion, none of the claim requests on file is allowable under Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.
3. The appeal fee paid by appellant I is reimbursed at 25%.

The Registrar:

The Chair:



A. Voyé

K. Bengi-Akyürek

Decision electronically authenticated