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**Datasheet for the decision
of 24 March 2022**

Case Number: T 2731/19 - 3.5.03

Application Number: 08253607.9

Publication Number: 2099236

IPC: H04R25/00

Language of the proceedings: EN

Title of invention:

Simulated surround sound hearing aid fitting system

Patent Proprietor:

Starkey Laboratories, Inc.

Opponents:

Oticon A/S / GN Resound A/S / Widex A/S

Headword:

Simulating surround sound/STARKEY

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 12(8)

Keyword:

Decision in written proceedings: cancellation of arranged oral proceedings following the respondent's withdrawal of its request for oral proceedings

Inventive step - (no): juxtaposition and obvious selection from equally likely alternatives



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 2731/19 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 24 March 2022

Appellant: Oticon A/S / GN Resound A/S / Widex A/S
(Opponents) Kongebakken 9 / Lautrupbjerg 7 / Nymøllevej 6
2765 Smørum / 2750 Ballerup / 3540 Lyngø (DK)

Representative: Betten & Resch
Patent- und Rechtsanwälte PartGmbH
Maximiliansplatz 14
80333 München (DE)

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

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

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 13 August 2019
rejecting the opposition filed against European
patent No. 2099236 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chair K. Bengi-Akyürek
Members: K. Peirs
N. Obrovski

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division to reject the opposition against the patent in suit. The opposition was based, amongst others, on the opposition ground under Article 100(a) EPC in conjunction with Article 56 EPC, having regard to the following prior-art document:

D1: US 5 785 661 A.

II. The appellant (joint opponents) requests that the decision under appeal be set aside and that the patent be revoked.

III. The respondent (proprietor) requests that the appeal be dismissed.

IV. In a communication under Article 15(1) RPBA 2020, the board indicated in its provisional opinion that the appeal was likely to succeed on the grounds that claim 11 as granted lacked an inventive step (Article 56 EPC) having regard to document D1.

V. In reaction to this communication, the respondent withdrew its request for oral proceedings.

VI. Oral proceedings before the board were then cancelled.

VII. Claim 11 as granted reads as follows (board's feature labelling):

(a) "A hearing aid fitting system for electronic hearing aids, comprising:

- (b) a memory adapted to store at least one head-related transfer function;
- (c) a head-related transfer function selection input (103, 312) allowing a user to select between different sets of head-related transfer functions for each ear of the user; and
- (d) a plurality of inputs including a stereo right, SR, input and a stereo left, SL, input;
- (e) a processor (102) connected to the memory and to the plurality of inputs,
- (f) the processor adapted to convert the SR and SL inputs into left surround, LS, left, L, center, C, right, R and right surround, RS, signals,
- (g) the processor further adapted to generate a processed version for each of the LS, L, C, R, and RS signals by application of a head-related transfer function at an individual angle of reception for each of the LS, L, C, R, and RS signals,
- (h) the head-related transfer functions being head-related transfer functions of the set of head-related transfer functions selected for the each ear;
- (i) the processor adapted to mix the processed version of the LS, L, C, R, and RS signals to produce a right output signal, RO, and a left output signal, LO, for a first hearing aid (104) and a second hearing aid (106),
- (j) wherein the system is adapted to transfer the RO and LO signals directly to the first and second hearing aids via wired or wireless radio connection; and
- (k) means adapted to adjust parameters of the right hearing aid and the left hearing aid in a manner that allows the wearer to correctly perceive sound sources located at different locations from the RO

signal applied to the right hearing aid and the LO signal applied to the left hearing aid."

Reasons for the Decision

1. *Decision in written proceedings*
 - 1.1 Oral proceedings were appointed upon the respondent's request. The respondent subsequently withdrew its request for oral proceedings (see point V above).
 - 1.2 As the board does not consider holding oral proceedings to be expedient or necessary (cf. Article 116(1) EPC), the decision is handed down in written proceedings (Article 12(8) RPBA 2020).
2. *Technical background*
 - 2.1 The opposed patent relates to a hearing-aid fitting procedure during which an acoustician simulates a plurality of listening situations to a hearing-aid patient by means of a set of loudspeakers reproducing a stereo test signal (SL, SR; see Figure 2 of the patent reproduced below).
 - 2.2 To provide the hearing-aid patient with an accurate simulation of how a normal-hearing person spatially perceives sound, the stereo test signal is processed in several stages. First, surround-sound synthesiser 206 generates left and right channels (L, R), a centre channel (C) as well as left and right surround-sound channels (LS, RS) starting from the stereo test signal. Then, a dedicated head-related transfer function (HRTF) is applied in filter banks 208L and 208R to both of the left and right channels, to the centre channel as well

as to both of the left and right surround-sound channels. The results of the filter banks are processed by summers 210 producing the output signals (LO, RO).

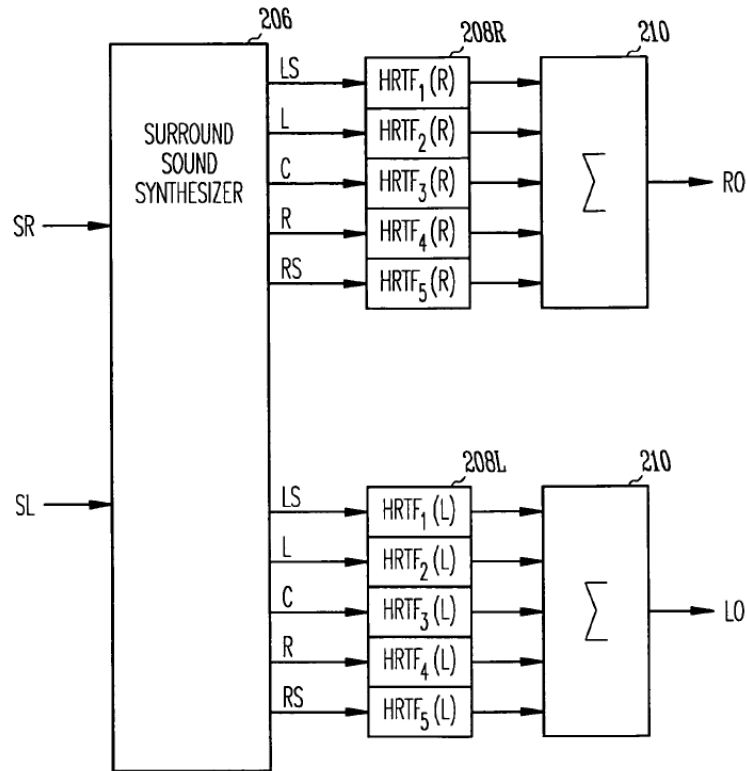


Fig.2

According to the invention, these output signals are transmitted directly to the hearing aid for reproduction to the hearing-aid patient. This allows to dispense with the need for a dedicated room with a "5.1 surround-speaker set-up" for this kind of hearing-aid fitting procedures.

3. *Claim 11 as granted - inventive step*

3.1 The board has reviewed Reasons 4 of the appealed decision. Concerning the disclosure of **D1**, which is taken to be the best possible starting point for

assessing inventive step, the only point under dispute between the parties was whether or not D1 discloses **feature (d)** (see the board's labelling in point VII above), i.e. feature "11.2" according to the decision under appeal.

The board makes the following comments in that regard:

- 3.1.1 Although digital audio file 107 taken by itself may not allow to determine whether its content represents *stereo* audio data or *mono* audio data, the skilled reader would immediately recognise at least from the split of the input from digital audio file 107 into an upper branch marked with the symbol "R" and a lower branch marked with the symbol "L" in Figure 36 of D1 that processor 114, used by virtual electroacoustic audiometer 15 to provide an appropriate stereo output signal 119, requires a right and a left input.
- 3.1.2 While the "R" and "L" input do require processing by the application of several transfer functions as apparent from Figure 36 of D1 to provide the appropriate stereo output signal, the skilled reader would nevertheless immediately recognise that the inputs to blocks 340 and 342 in Figure 36 are at least crude versions of a stereo right and a stereo left signal.
- 3.1.3 Hence, feature (d) is disclosed in D1.
- 3.2 Given that the parties did not contest the disclosure of D1 concerning other features, the analysis of D1 as set out in Reasons 4.2 of the impugned decision can be adopted, from which it follows that the subject-matter of claim 11 differs from that of D1 by

- features (c) and (h), i.e. features "11.1.2" and "11.4.1" of the decision under appeal;
- features (f), (g) and (i), i.e. part of feature "11.3" together with features "11.4" and "11.5" of the appealed decision;
- feature (j), i.e. feature "11.6" of the decision under appeal.

This is analysed more in detail as follows:

3.2.1 As regards **features (c) and (h)**, the board understands from the phrase "the choice of the HRTF function in D1 is made based on the location in space p_n of the audio source of the audio file" (emphasis added by the board) in Reasons 4.2 of the impugned decision that the opposition division acknowledged the disclosure in D1 of a head-related transfer function *taken by itself*, but deemed the selection of it as per features (c) and (h) to be a distinguishing feature.

3.2.2 Concerning **features (f), (g) and (i)**, D1 discloses in column 28, lines 41 to 46 and in Figure 36 the application of

- the free-field to face-plate transfer function,
- the inverse of the supplied ICP receiver-to-microphone transfer function

and

- reverberation/additional source filtering of digital audio file 107

to the stereo right and stereo left input signal and not to each of the LS, L, R and RS signals.

3.2.3 With respect to **feature (j)**, D1 merely discloses in column 28, lines 28 to 56 as well as Figures 10 and 36 an acoustic coupling and no direct wired or wireless radio connection.

3.3 Partial problems

3.3.1 As to **features (c) and (h)**, the opposition division attributed in Reasons 4.3 of the impugned decision objective technical problem (iii), i.e. to *"provide a simplifying alternative to the individual measurement of HRTFs in order to get rid of the measurement step"*.

The respondent argued that this problem pointed towards the solution, but the board cannot see how this could be the case. Rather, the board acknowledges that D1 discloses a reference measurement of the HRTF in column 20, line 40 to column 22, line 4, which seems to be related to the "individual measurement of HRTFs" of objective technical problem (iii).

Regarding features (c) and (h) as distinguishing features, the skilled reader would readily derive the technical effect of those distinguishing features to be to simplify the determination of the HRTF, because a mere selection (e.g. from a database) is typically simpler than a measurement.

Hence, there is no reason to challenge objective technical problem (iii).

3.3.2 For **features (f), (g) and (i)**, the appellant proposed the same objective technical problem as "problem (i)"

mentioned in Reasons 4.3 of the impugned decision, namely "finding an alternative way of simulating a spatial surround field in the hearing aid system of D1", even though the assessment of the opposition division was based, among others, on the acknowledgement of the stereo input of feature (d) as a distinguishing feature, to which the board does not agree for the reasons set out in point 3.1 above. The respondent did not dispute the pertinence of "problem (i)".

However, "problem (i)" cannot be associated with features (f), (g) and (i). In particular, feature (f) relates to the conversion of a stereo right and left signal to a five-channel arrangement with a right, left, centre, right-surround and left-surround channel. Stereo signals do not impart a "surround effect". It makes no technical sense to consider finding an alternative way of simulating a spatial surround field if D1 does not concern a spatial surround field to start from.

Rather, the introduction of three additional channels by the conversion in feature (f), including two surround channels, together with the corresponding subsequent processing as per feature (g), allows for a wider sound stage, even if those additional channels are (down-)mixed again at a later stage to a two-channel arrangement as per feature (i). Therefore, the objective technical problem associated with features (f), (g) and (i) is to be framed as *"how to provide for a wider sound stage in the hearing-aid system of D1"*.

3.3.3 As to **feature (j)**, the opposition division attributed objective technical problem (ii) in Reasons 4.3 of the

appealed decision, namely *"finding an alternative way of providing directly the spatial sound field to the hearing aids in the hearing aid fitting system of D1"*.

The parties did not dispute this. Given that the virtual electroacoustic audiometer (VEA) of D1 presents, in accordance with column 28, lines 35 to 56 of D1, the synthesised realistic acoustic signals by coupling spatialised sounds directly to the microphone of the left and right hearing aid, i.e. via direct acoustic coupling, the board sees no reason to challenge this either.

3.3.4 The board endorses the view set out in Reasons 4.3.2 of the appealed decision that there is no synergistic effect produced by the juxtaposition of

- **features (c) and (h)** (taken in combination),
- **features (f), (g), (i)** (taken in combination)

and

- **feature (j)**.

The respondent referred to paragraph [0011] of the patent in suit and considered "improved fitting and fine-tuning of a hearing aid" or the enablement of "the quick and accurate fitting of a hearing aid" as the synergistic effect of these features. The board cannot see, however, how any of the distinguishing features would relate to "fitting" or "fine-tuning" of a hearing aid.

Consequently, given that distinct, independent problems are addressed, the problem-solution approach relying on

partial objective technical problems can be adopted.

3.4 Obviousness

3.4.1 Concerning **features (c) and (h)**, the skilled person in the field of digital sound processing would have known, based on their common general knowledge, that databases with multiple examples of HRTFs for different head types exist. As a result, it would have been immediately apparent for the skilled person to select an HRTF from such a database to solve the problem posed. It is, in this respect, immaterial whether or not D1 itself provides a pointer for finding a simplified alternative to measure HRTFs or that D1 goes to great lengths to explain the measurement process. The same holds for the advantages attributed by D1 to the measuring process.

3.4.2 As regards **features (f), (g) and (i)**, the skilled person would have known, based on their common general knowledge, that upmixing a stereo input signal followed by subsequent downmixing back to a stereo output signal allows to widen the sound stage. The precise number of channels that are to be considered for this upmix-/downmix-combination is a matter of routine design.

Moreover, when more channels than a left and right channel are involved in the up- and downmixing, the skilled person would have immediately realised that the transfer functions 340/344 and 342/345 of Figure 36 of D1, which were dedicated to the right and left channel respectively, should be augmented corresponding to the number of input channels.

3.4.3 With respect to **feature (j)**, the skilled person would have been aware of several, *equally likely*, alternative

direct couplings to provide input to a hearing aid,
e.g. via

- a Direct-Audio-Input using a proprietary jack or an audio boot (i.e. a direct wired connection), or
- a direct tele-coil connection (i.e. a direct wireless connection).

Feature (j) therefore merely represents an obvious selection among a number of well-known, alternative possibilities. The fact that D1 itself does not point at finding an alternative way of providing directly spatial sounds or that it attributes a clear advantage to this direct acoustic coupling bears no relevance as to the assessment of inventive step on the basis of the problem-solution approach relying on the *objective* technical problem.

3.5 In conclusion, the subject-matter of claim 11 as granted does not involve an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chair:



B. Brückner

K. Bengi-Akyürek

Decision electronically authenticated