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Datasheet for the decision of 8 October 2024

Case Number: T 0429/22 - 3.5.05

Application Number: 15154417.8

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IPC: H04R1/40, H04R1/10, H04R25/00, G01C9/00

Language of the proceedings: EN

Title of invention:
A hearing-aid device comprising a sensor member

Patent Proprietor:
Oticon A/S

Opponent:
Sivantos Pte. Ltd.

Headword:
Hearing aid with accelerometer or gyroscope/OTICON

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
Added subject-matter - all claim requests (yes)

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Case Number: T 0429/22 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 8 October 2024

Appellant: (Patent Proprietor)	Oticon A/S Kongebakken 9 2765 Smørum (DK)
Representative:	Cohausz & Florack Patent- & Rechtsanwälte Partnerschaftsgesellschaft mbB Bleichstraße 14 40211 Düsseldorf (DE)
Respondent: (Opponent)	Sivantos Pte. Ltd. 18 Tai Seng Street No. 08-08 18 Tai Seng Singapore 539775 (SG)
Representative:	FDST Patentanwälte Nordostpark 16 90411 Nürnberg (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 10 December 2021 revoking European patent No. 2908550 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chair	J. Eraso Helguera
Members:	K. Peirs
	F. Bostedt

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division to revoke the opposed patent (Article 101(3)(b) EPC). The opposition division deemed the main request as well as the fifteen auxiliary requests (auxiliary requests 1 to 13 and auxiliary requests 7A and 7B) not to be allowable under Article 123(2) EPC.

II. Oral proceedings before the board were held on 8 October 2024. The parties' final requests were as follows:

- The proprietor (appellant) requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the claim requests underlying the appealed decision, i.e. the main request or one of fifteen auxiliary requests, in the following order: auxiliary requests 1 to 7, 7A, 7B, 8 to 13.

- The opponent (respondent) requested that the appeal be dismissed.

At the end of the oral proceedings, the board's decision was announced.

III. Claim 1 of the **main request** reads as follows (board's feature labelling):

(a) "A hearing aid device (2; 2') for improving, augmenting and/or protecting the hearing capability of a user (4; 4') when receiving acoustic signals from the surroundings of the user, wherein the hearing device is adapted for being arranged

behind the ear (6) with a tube (12) leading air-borne acoustic signals into the ear canal or with a loudspeaker (32) arranged close to or in the ear canal, as a unit entirely or partly arranged in the pinna and/or in the ear canal, as a unit attached to a fixture implanted into the skull bone, or as an entirely or partly implanted unit,
the hearing aid device (2; 2') comprising an input unit for generating corresponding audio signals, a signal processing unit for modifying the audio signals and an output unit for providing modified audio signals as audible signals to at least one of the user's ears (6),

(b) the hearing aid device comprising a sensor member (8) for detecting the movement and/or acceleration and/or orientation and/or position of the hearing aid device,

(c) the input unit of the hearing aid device (2; 2') comprises at least two hearing aid microphones (38; 38')
CHARACTERIZED IN THAT

(d) the sensor member (8) comprises two accelerometers

(e) the hearing aid device comprises a control unit for determining a deviation from an intended relative position of the hearing aid microphones (38; 38') on the basis of measurements made by the two accelerometers of the sensor member (8), and

(f) wherein the hearing aid device is configured to compensate for a possible dislocation of the hearing aid microphones (38; 38') from the intended position by the control unit controlling hearing aid device settings on the basis of the measurements made by the sensor member (8)."

IV. Claim 1 of **auxiliary request 1** differs from claim 1 of the main request in that feature (e) is replaced by the

following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (e)):

(g) "the hearing aid device comprises a control unit for determining a deviation from an intended relative position of the hearing aid microphones (38; 38') in a vertical direction on the basis of measurements made by the two accelerometers of the sensor member (8), the vertical direction being defined by the direction of gravity, and".

V. Claim 1 of **auxiliary request 2** differs from claim 1 of auxiliary request 1 in that feature (g) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (g)):

(h) "the hearing aid device comprises a control unit for determining a deviation from an intended relative position of the hearing aid microphones (38; 38') in a vertical direction on the basis of measurements made by the two accelerometers of the sensor member (8), the vertical direction being defined by the direction of gravity, the intended relative position being in the same horizontal plane perpendicular to the vertical direction, and".

VI. Claim 1 of **auxiliary request 3** differs from claim 1 of auxiliary request 2 in that it comprises, at the end, the following feature (board's feature labelling):

(i) ", wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of at least one of (a) a noise reduction system of the hearing aid device,

(b) a directional system of the hearing aid device with an adaptive directional algorithm providing a combined signal based on the signals of the hearing aid microphones (38; 38'), and (c) a feedback estimation unit comprising an adaptive feedback algorithm for estimating a feedback path from the output unit to the input unit".

VII. Claim 1 of **auxiliary request 4** differs from claim 1 of auxiliary request 2 in that it comprises, at the end, the following feature (board's feature labelling):

(j) ", wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of a noise reduction system of the hearing aid device".

VIII. Claim 1 of **auxiliary request 5** differs from claim 1 of auxiliary request 2 in that it comprises, at the end, the following feature (board's feature labelling):

(k) ", wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of a noise reduction system of the hearing aid device, the noise reduction system comprising a directional system with an adaptive directional algorithm for providing a combined signal based on signals from the at least two hearing aid microphones (38; 38')".

IX. Claim 1 of **auxiliary request 6** differs from claim 1 of auxiliary request 5 in that it comprises, at the end, the following feature (board's feature labelling):

(l) ", and wherein the control unit is configured for changing the adaptation speed in the adaptive

algorithm of the noise reduction system on the basis of the measurements made by the sensor member (8)".

X. Claim 1 of **auxiliary request 7** differs from claim 1 of the main request in that

- feature (d) is deleted,

- feature (e) is replaced by the following feature (board's feature labelling; the board also struck through differences vis-à-vis feature (e)):

(m) "the hearing aid device comprises a control unit for determining a deviation from an intended relative position of the hearing aid microphones (38; 38') on the basis of measurements made by the ~~two accelerometers of the~~ sensor member (8), and",

and in that

- it comprises, at the end, the following feature (board's feature labelling):

(n) ", wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of an adaptive spatial algorithm of the hearing aid device, and wherein the control unit is configured for changing the adaptation speed in the adaptive spatial algorithm on the basis of the measurements made by the sensor member (8)".

XI. Claim 1 of **auxiliary request 7A** differs from claim 1 of the main request in that

- feature (d) is deleted,

- features (e) and (f) are replaced, respectively, by the following features (board's feature labelling; the board also highlighted differences vis-à-vis features (e) and (f)):

(o) "the hearing aid device comprises a control unit for determining a deviation from an intended relative position of the hearing aid microphones (38; 38') in a vertical direction on the basis of measurements made by an ~~the two~~ accelerometer~~s~~ of the sensor member (8), the vertical direction being defined by the direction of gravity, the intended relative position being in the same horizontal plane perpendicular to the vertical direction, and";

(p) "wherein the hearing aid device is configured to compensate for a possible dislocation of the hearing aid microphones (38; 38') from the intended relative position by the control unit controlling hearing aid device settings on the basis of the measurements made by the accelerometer of the sensor member (8)"

and in that

- it comprises, at the end, the following feature (board's feature labelling):

(q) ", wherein the hearing device settings controlled to compensate for the dislocation are settings of a noise reduction system of the hearing aid device, the noise reduction system being a directional system for providing a combined signal based on

signals from the at least two hearing aid microphones (38; 38'), and wherein the control unit is configured for changing the adaptation speed in an adaptive algorithm of the noise reduction system on the basis of the measurements made by the accelerometer of the sensor member (8) if the measurements made by the accelerometer of the sensor member (8) represent movement of the user's head."

XII. Claim 1 of **auxiliary request 7B** differs from claim 1 of auxiliary request 7A in that feature (q) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (q)):

(r) ", wherein the hearing device settings which are controlled to compensate for the dislocation are settings of a noise reduction system of the hearing aid device, the noise reduction system being a directional system for providing a combined signal based on signals from the at least two hearing aid microphones (38; 38'), wherein the control unit modifies the settings to compensate for the dislocation, and wherein the control unit is configured for changing the adaptation speed in an adaptive algorithm of the noise reduction system on the basis of the measurements made by the accelerometer of the sensor member (8) if the measurements made by the accelerometer of the sensor member (8) represent movement of the user's head."

XIII. Claim 1 of **auxiliary request 8** differs from claim 1 of auxiliary request 7 in that feature (n) is replaced by the following feature (board's feature labelling; the

board also underlined differences vis-à-vis feature (n)):

(s) ", wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of an adaptive spatial algorithm of the hearing aid device, the adaptive spatial algorithm being an adaptive directional algorithm of a noise reduction system for providing a combined signal based on signals from the at least two hearing aid microphones (38; 38'), and wherein the control unit is configured for changing the adaptation speed in the adaptive spatial algorithm on the basis of the measurements made by the sensor member (8)".

XIV. Claim 1 of **auxiliary request 9** differs from claim 1 of the main request in that

- feature (d) is deleted,

- features (e) and (f) are replaced, respectively, by the following features (board's feature labelling; the board also highlighted differences vis-à-vis features (e) and (f)):

(t) "the hearing aid device comprises a control unit for determining a deviation from an intended ~~relative~~ position of the hearing aid microphones (38; 38'), wherein the control unit of the hearing aid device is configured for detecting if the hearing aid user (4; 4') is turning the head on the basis of measurements made by the ~~two accelerometers of the~~ sensor member (8), and";

(u) "wherein the control unit of the hearing aid device is configured for improving and/or augmenting received acoustic signals from the surroundings of the hearing aid user by compensating for the turning the head movement if it is detected that the hearing aid user is turning the head, in that the control unit of the hearing aid device is configured to compensate for a possible dislocation of the hearing aid microphones (38; 38') from the intended position by the control unit controlling hearing aid device settings on the basis of the measurements made by the sensor member (8)."

XV. Claim 1 of **auxiliary request 10** differs from claim 1 of auxiliary request 9 in that feature (t) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (t)):

(v) "the hearing aid device comprises a control unit for determining a deviation from an intended position of the hearing aid microphones (38; 38'), wherein the control unit of the hearing aid device is configured for detecting if the hearing aid user (4; 4') is turning the head about an axis parallel to the direction of gravity on the basis of measurements made by the sensor member (8), and".

XVI. Claim 1 of **auxiliary request 11** differs from claim 1 of auxiliary request 10 in that it comprises, at the end, the following feature (board's feature labelling):

(w) ",wherein the hearing aid device settings controlled to compensate for the dislocation comprise the settings of an adaptive spatial

algorithm of the hearing aid device".

XVII. Claim 1 of **auxiliary request 12** differs from claim 1 of auxiliary request 11 in that it comprises, at the end, the following feature (board's feature labelling):

(x) ", wherein the adaptive spatial algorithm is one of (a) an algorithm of a noise reduction system of the hearing aid device, (b) an adaptive directional algorithm of a directional system of the hearing aid device providing a combined signal based on the signals of the hearing aid microphones (38; 38'), and (c) an adaptive feedback algorithm of a feedback estimation unit for estimating a feedback path from the output unit to the input unit".

XVIII. Claim 1 of **auxiliary request 13** differs from claim 1 of auxiliary request 12 in that it comprises, at the end, the following feature (board's feature labelling):

(y) "and wherein the control unit is configured for changing the adaptation speed in the adaptive spatial algorithm on the basis of the measurements made by the sensor member (8)".

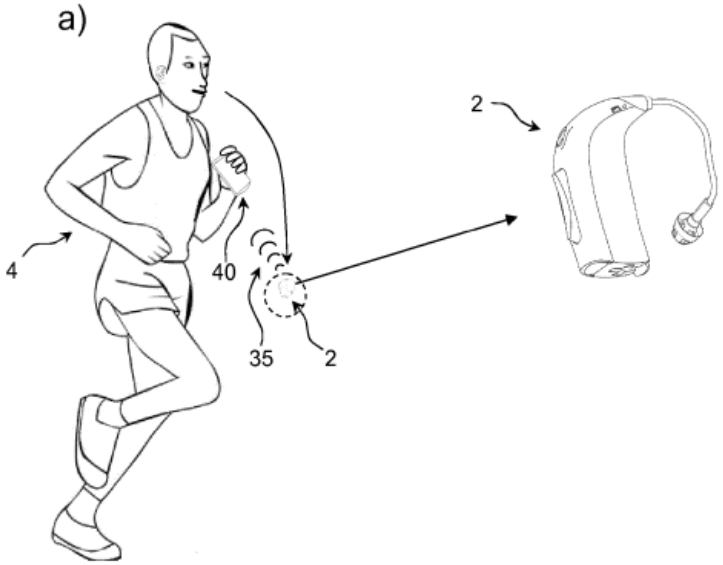
Reasons for the Decision

1. *Technical background*

1.1 The opposed patent relates to a hearing-aid device comprising a sensor member for detecting the movement, acceleration, orientation or spatial position of the hearing-aid device.

1.2 The problem which the invention underlying the opposed patent aims to solve relates to allowing a hearing-aid device to continuously and automatically provide information about the level of physical activity and the head movement of the user of the hearing-aid device. To do so, the hearing-aid device according to the invention comprises an accelerometer and/or a gyroscope.

1.3 An embodiment of the opposed patent is shown in Figure 10 a), reproduced below, which illustrates a situation where a hearing-aid device (2) is dropped by mistake by a hearing-aid user (4) who is running. The hearing-aid device (2) is provided with a free-fall detector which sends a signal (35) to a mobile phone (40). The mobile phone (40) comprises a global-positioning-system device that determines the location of the hearing-aid device (2). It also has means for logging the position where the hearing-aid device (2) has been lost. In this way, the hearing-aid device (2) and the mobile phone (40) constitute an alarm system indicating when and where the hearing-aid device (2) is dropped.



2. *Main request: claim 1 - added subject-matter*

Reasons 1.2 of the appealed decision found that the application as filed did not directly and unambiguously disclose

- feature "M1.4.1", i.e. **feature (d)** as labelled by the board,

and

- feature "M1.6", i.e. **feature (e)** in the board's labelling.

The board concurs. The appellant's arguments in this respect were not convincing for the following reasons:

2.1 In relation to **feature (d)**, the passages cited by the appellant on pages 3, 7, 8, 11, 28, 29, 31 and 40 of the original description at most concern an "acceleration sensor" or "accelerometer" together with a gyroscope and not, as correctly pointed out by the respondent, "two accelerometers" as would be required by feature **(d)**.

Moreover, regarding the appellant's reference to Figures 11a and 12b together with the passages on pages 52 to 55 of the original description, the respondent correctly emphasised the need for a direct and unambiguous disclosure. The board acknowledges that the paragraph bridging pages 54 and 55 of the description as filed refers to a measurement by means of "a pair or more accelerometers". Nevertheless, it does not share the appellant's point of view that a configuration with three (or more) accelerometers would necessarily imply that at least one of the hearing-aid

devices in the "pair of hearing aid devices" referred to in lines 15 to 18 of page 52 of the description as filed comprises at least two accelerometers. This is because, in the art of hearing-aid devices, it is typical for certain tasks to be outsourced to accessory devices such as the "auxiliary devices" referred to in Reasons 1.3 of the appealed decision. The board agrees with the appellant that the skilled reader would not have considered "exotic configurations", such as an accelerometer mounted on someone's foot in this context. However, acceleration measurements made by, for instance, a smartwatch or smartphone could be readily taken into account instead to improve measurement accuracy as suggested in the paragraph bridging pages 54 and 55 as filed. The accelerometer present in such an accessory device can complement the measurements from the left and right accelerometers of the "pair of hearing-aid devices". Together, these three accelerometers can measure the acceleration "in the same geometric plane" as set out in lines 1 to 4 of page 55 of the description as filed.

Even if Reasons 1.3 of the appealed decision, as brought forward by the appellant, did indeed erroneously take into account the "auxiliary devices" when distributing the "two or more accelerometers" among the components of a binaural hearing system, the board would not be swayed. This is because the paragraph bridging pages 54 and 55 as filed does not disclose that the sensor member of feature (b), rather than the claimed hearing-aid device as a whole, comprises "two accelerometers" as part of one component that fits into all of the hearing-aid device types recited in feature (a). Thus, this paragraph does not directly and unambiguously disclose feature (e). This also applies to the accelerometer(s) measuring the

"Pitch head movement" (which the appellant referred to as "pitch motion") shown in Figure 11a of the opposed patent. In this respect, it is important to distinguish between a "pitching motion" and a "linear head movement". The former term describes a rotational movement, specifically an oscillation about a transverse axis. Conversely, the latter term (used, as correctly pointed out by the respondent, in the passage spanning pages 54 and 55 of the original application) is characterised by motion along a straight line.

2.2 In relation to **feature (e)**, the board is not satisfied that the appellant's references to pages 12 to 15, 32 to 34, 38, 40 and 42 to 44 of the original description, to original Figures 4, 7 and 9 and to original claim 4 provide for a direct and unambiguous disclosure. The passages referred to concern at most a dislocation from an "optimal" (instead of the more general "intended") position of the hearing-device microphones, such as microphones 38 and 38' in original Figure 4, with respect to a "vertical position" or in "the horizontal plane H", based on measurements from "an accelerometer".

To explain this in more detail, the board notes the following:

2.2.1 The appellant's arguments, with reference to page 43, line 17 to page 44, line 16 and Figure 9 of the application as filed,
that (appellant's emphasis)
- "a location in the same horizontal plane may be a preferred intended position for many cases, but that it is clearly not mandatory"

and that

- "the intended position in the vertical direction is clearly not mandatory"

did not convince the board.

In the board's view, the cross-section in a horizontal plane shown in Figure 9 unequivocally teaches the skilled reader to *focus* on

- dislocations regarding the "vertical position" as referred to at original page 12, line 20

or on

- deviations regarding the hearing-aid microphones' location in "the horizontal plane H" as set out in the paragraph bridging original pages 32 and 33.

This is illustrated in particular by the phrase "where the person is looking straight forward" in lines 20 and 21 of original page 33. Similar considerations apply to the scenario considered in the paragraph bridging pages 43 and 44 of the original description where "hearing aid user 4 is turning his head as illustrated in Fig. 9b)".

2.2.2 Furthermore, the respondent correctly pointed out in this respect that the term "intended [relative] position" in accordance with feature (e) occurs only three times in the application as filed, namely on page 7, line 10 and on page 42, lines 3 and 4 of the originally filed description as well as in original claim 1. There, as pointed out by the respondent, this term is not described in relation to measurements made by two accelerometers of a sensor member as in feature (e). This applies irrespective of whether the term "intended [relative] position" is construed as an objective "set point" determinable by a set of rules (i.e. in the appellant's sense) or as a subjective, user-preferred position.

2.3 In conclusion, there is no reason for the board to overturn the opposition division's finding in Reasons 1.5 of the appealed decision that the main request does not comply with Article 123(2) EPC.

3. *Auxiliary requests 1 to 7, 7A, 7B and 8 to 13: claim 1 - added subject-matter*

On page 7 of its written reply to the appeal, the respondent had quoted a passage from the notice of opposition indicating that the phrase "by controlling hearing aid device settings on the basis of measurements made by the sensor member (8)", which was present in granted claim 1, had been taken out of the context in which it was originally disclosed. While this granted claim 1 was not pursued in any of the still pending claim requests, the board notes that claim 1 of the auxiliary requests on file contains a similar phrase, where the amendments underlying these auxiliary requests do not restore the originally disclosed context referred to by the respondent. The reasons for this are as follows.

3.1 In relation to **auxiliary requests 1 to 6**, the board observes that, by virtue of **feature (f)**, the possible "dislocation" from the "intended [relative] position" must be compensated on the basis of "the measurements" performed by the "sensor member" as per feature (b). In the appellant's favour, the board will understand these "measurements" to be provided by the "detecting" mentioned in feature (b). These measurements, however, need not necessarily involve any acceleration but could relate to the hearing-aid device's orientation or position as per feature (b). The passages in the original application cited by the parties, in particular the passage at lines 18 to 27 on page 40 of

the description as filed relating to original Figure 9 b) do not directly and unambiguously disclose such an orientation or such a position. Instead, that passage on page 40 as filed relies on "[multiple] accelerometers and/or gyroscopes in the hearing aid devices" to detect "head movements". The appellant also refers in this context to the passage at lines 9 to 17 on page 12 of the description as filed and to original claim 4, but these references do not relate to the hearing-aid device's orientation or position either. Instead, they refer to the general situation of the hearing-aid user "moving or turning the head" and do so without mentioning an accelerometer or a gyroscope.

3.2 The same applies *a fortiori* to **auxiliary requests 7 and 8**, given that, by virtue of **feature (m)**, the measurements on the basis of which the hearing-aid device settings are controlled as per feature (f) can be of any kind made by the sensor member and not just those provided by the "detecting" mentioned in feature (b). This is also valid for **auxiliary request 9** due to **feature (t)** as well as for **auxiliary requests 10 to 13** in view of **feature (v)**.

3.3 Moreover, in accordance with **feature (p)** underlying **auxiliary requests 7A and 7B**, it is specified in more detail that the measurements taken into account to control the "hearing-aid device settings" are made by "the accelerometer of the sensor member" in the hearing-aid device to compensate for a possible dislocation from the "intended relative position". In the board's view, the same as set out in point 2.2 above regarding feature (e) applies here. In particular, the passages referred to at most concern a dislocation from an "optimal" position of the hearing-device microphones, instead of from an "intended

relative position". The appellant particularly referred to original Figure 9b and the passage at lines 18 to 27 on page 40 of the description as filed in this regard. However, instead of "the accelerometer of the sensor member", this passage only mentions, as set out in point 3.1 above, "[t]he accelerometers and/or gyroscopes in the hearing aid devices" in the context of detecting "head movements" based on "the detected acceleration".

3.4 Hence, auxiliary requests 1 to 7, 7A, 7B and 8 to 13 are also not allowable under Article 123(2) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

B. Brückner J. Eraso Helguera

Decision electronically authenticated