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**Datasheet for the decision
of 14 October 2021**

Case Number: T 0965/19 - 3.5.03

Application Number: 12193225.5

Publication Number: 2733962

IPC: H04B15/02, H04R25/00, H05K1/02

Language of the proceedings: EN

Title of invention:
A hearing aid having a near field resonant parasitic element

Patent Proprietor:
GN Hearing A/S

Opponent:
Oticon A/S

Headword:
Common ground potential/GN Hearing

Relevant legal provisions:
EPC Art. 100(c), 123(2)

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



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 0965/19 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 14 October 2021

Appellant I: GN Hearing A/S
(Patent Proprietor) Lautrupbjerg 7
2750 Ballerup (DK)

Representative: Zacco Denmark A/S
Arne Jacobsens Allé 15
2300 Copenhagen S (DK)

Appellant II: Oticon A/S
(Opponent) Kongebakken 9
2765 Smørum (DK)

Representative: Cohausz & Florack
Patent- & Rechtsanwälte
Partnerschaftsgesellschaft mbB
Postfach 10 18 30
40009 Düsseldorf (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
17 January 2019 concerning maintenance of the
European Patent No. 2733962 in amended form.**

Composition of the Board:

Chair K. Bengi-Akyürek
Members: K. Peirs
C. Almberg

Summary of Facts and Submissions

- I. The appeal is against the interlocutory decision of the opposition division to maintain the patent in amended form according to the proprietor's then second auxiliary request. Claim 1 of the proprietor's main request was deemed to be not novel (Article 54 EPC). Claim 13 of the proprietor's first auxiliary request was found not to involve an inventive step (Article 56 EPC).
- II. A communication was issued pursuant to Article 15(1) RPBA 2020, where the board indicated its preliminary opinion regarding, amongst others, added subject-matter of claim 1 of all claim requests then on file (cf. Article 123(2) EPC).
- III. Oral proceedings before the board were held on 14 October 2021 by videoconference.
- IV. Appellant I (patent proprietor) requests that the decision under appeal be set aside and,
 - as a **main request**, that the opposition be rejected, i.e. that the patent be maintained as granted;
 - in the alternative, that the patent be maintained in amended form according to one of **38 auxiliary requests**.
- V. Appellant II (opponent) requests that the decision under appeal be set aside and that the patent be revoked.

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

VII. Claim 1 of the **main request** (claim 1 as granted) reads as follows (board's emphasis by bold and italics):

"A hearing aid comprising
a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal,
a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid,
a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal,
a transceiver connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field,
an electrical circuitry comprising the signal processor, the transceiver, interconnecting transmission lines, antenna structures and/or further electrical components, ***the transceiver having a connection to a ground potential***, the electrical circuitry extending over an area of a support substrate, characterized in that the hearing aid further comprises a resonant element being provided within the near field of the electrical circuitry, ***the resonant element being connected to the ground potential through energy dissipating means*** to terminate and dissipate electromagnetic noise from at least a part of the area."

VIII. Claim 1 of **auxiliary request 0A** reads as follows (with the same emphasis by bold and italics introduced by the

board as in point VII; amendments vis-à-vis claim 1 of the main request underlined by the board):

"A hearing aid comprising
a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal,
a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid,
a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal,
a transceiver connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field, wherein the antenna is configured to have a frequency of at least 1 GHz,
an electrical circuitry comprising the signal processor, the transceiver, interconnecting transmission lines, antenna structures and/or further electrical components, ***the transceiver having a connection to a ground potential***, the electrical circuitry extending over an area of a support substrate, characterized in that the hearing aid further comprises a resonant element being provided within the near field of the electrical circuitry, the resonant element being suitable for radiating an electromagnetic field at frequencies greater than 1 GHz, ***the resonant element being connected to the ground potential through energy dissipating means*** to terminate and dissipate electromagnetic noise from at least a part of the area."

IX. Claim 1 of **auxiliary request 9A** reads as follows (with the same emphasis by bold and italics introduced by the

board as in point VII; amendments vis-à-vis claim 1 of the main request underlined by the board):

"A hearing aid comprising
a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal,
a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid,
a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal,
a transceiver connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field,
an electrical circuitry comprising the signal processor, the transceiver, interconnecting transmission lines, antenna structures and/or further electrical components, **the transceiver having a connection to a ground potential**, the electrical circuitry extending over an area of a support substrate being a printed circuit board,
characterized in that
the hearing aid further comprises a resonant element being provided within the near field of the electrical circuitry, **the resonant element being connected to the ground potential through energy dissipating means** to terminate and dissipate electromagnetic noise from at least a part of the area, and wherein the printed circuit board has a first layer being a top signal layer comprising at least a part of the electrical circuitry, a second, middle layer comprising the resonant element and a third, bottom layer comprising

the ground plane."

- X. Claim 1 of **auxiliary request 11A** reads as follows (with a similar emphasis by bold and italics introduced by the board as in point VII; amendments vis-à-vis claim 1 of the main request highlighted by the board using strike-through and underlining):

"A hearing aid comprising a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal, a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid, a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal, an IC chip being a radio ~~transceiver~~ connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field, an electrical circuitry comprising the signal processor, the IC chip ~~transceiver~~, interconnecting transmission lines, antenna structures and/or further electrical components, ***the IC chip ~~transceiver~~ having a connection to a ground potential***, the electrical circuitry extending over an area of a support substrate, characterized in that the hearing aid further comprises a resonant element being provided within the near field of the electrical circuitry, ***the resonant element being connected to the ground potential through energy dissipating means*** to terminate and dissipate electromagnetic noise from at least a part of the area."

- XI. Claim 1 of **auxiliary request 13** reads as follows (board's emphasis by bold and italics):

"A method of reducing or eliminating electromagnetic noise from a hearing aid, the hearing aid having a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal, a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid, a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal, a transceiver connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field, an electrical circuitry comprising the signal processor, the transceiver, interconnecting transmission lines, antenna structures and/or further electrical components, **the transceiver having a connection to a ground potential**, the electrical circuitry extending over an area of a support substrate, the electrical circuitry having a radiator configured to radiate in a first frequency band, the electromagnetic noise being radiated from the electrical circuitry in a second frequency band different from the first frequency band, the method characterised by receiving the electromagnetic noise radiated from at least a part of the area by a resonant element positioned in the near field of the electrical circuitry, the resonant element being configured to resonate in the second frequency band, dissipating the electromagnetic noise received from at least a part of the area **by the resonant element through a connection to the ground potential through a dissipating element.**"

XII. Claim 1 of **auxiliary request 14** includes all the features of claim 1 of auxiliary request 13 and further

comprises the following phrase at the end:

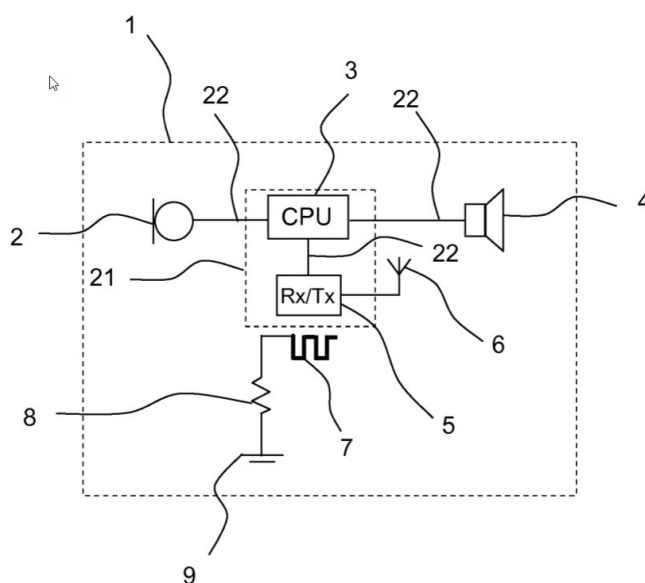
", and wherein the resonant element implements a notch filter filtering the electromagnetic radiation noise".

XIII. Claim 1 of **all other auxiliary requests on file** comprises the same two passages as those emphasised by bold and italics in point VII above but with the term "transceiver" being replaced by the expression "IC chip" in **auxiliary requests 11 and 11B**, and by the term "radio" in **auxiliary requests 12, 12A and 12B**.

Reasons for the Decision

1. *Technical background*

The opposed patent aims to reduce "unwanted electromagnetic radiation" emitted by a transceiver (5) and antenna elements (6) in a hearing aid (1), or in any similar device where space restrictions apply (e.g. mobile phones or medical implants).



It does so by positioning a (mechanical) resonant element (7) in the near field of the hearing aid's circuitry (21) such as to dissipate the unwanted electromagnetic radiation around the area of that circuitry through an energy dissipating means (8), i.e. a resistor, connected to the resonant element and a ground potential (9).

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

2.1 Claim 1 of the **main request** comprises the following limiting features (as labelled by the board):

- (a) A hearing aid comprising
- (b) a microphone for reception of sound and conversion of the received sound into a corresponding first audio signal;
- (c) a signal processor for processing the first audio signal into a second audio signal compensating a hearing loss of a user of the hearing aid;
- (d) a speaker that is connected to an output of the signal processor for converting the second audio signal into an output sound signal;
- (e) a transceiver connected to the signal processor for wireless data communication interconnected with an antenna for emission and reception of an electromagnetic field;
- (f) an electrical circuitry comprising the signal processor, the transceiver, interconnecting transmission lines, antenna structures and/or further electrical components;
- (g) the transceiver having a connection to a ground potential;
- (h) the electrical circuitry extending over an area of a support substrate;

- (i) wherein the hearing aid further comprises a resonant element being provided within the near field of the electrical circuitry;
- (j) the resonant element being connected to the ground potential through energy dissipating means to terminate and dissipate electromagnetic noise from at least a part of the area.

2.2 Claim 1 as granted is related to original claims 1 and 5, but comprises, for the following reasons, at least one amendment that introduces subject-matter extending beyond what was originally disclosed (Article 123(2) EPC).

2.2.1 While the board acknowledges that hearing aids are typically small devices (cf. point 4.1.2, second paragraph, of the reasons of the decision under appeal), this does not mean that there is a direct and unambiguous disclosure for the limitation implied in **features (g) and (j)** that the transceiver and the resonant element are connected to the same ground potential.

2.2.2 The board does not agree with appellant I's view that the skilled reader would implement a "common ground potential" for the electrical circuitry in the hearing aid of claim 1 merely based on their common general knowledge within the context of the present application as filed. On the contrary, appellant II convincingly argued that the passages on page 5, lines 17 to 20 and page 13, lines 8 and 9 of the description as filed would, if anything, guide the skilled reader away from connecting the transceiver and resonant element to the very *same* ground potential.

In particular, the latter passage *explicitly* teaches

the skilled reader to provide the resonant element on a separate printed circuit board (PCB). Given the wireless communication made possible by the transceiver of the hearing aid of the present application as filed between those components of the hearing aid that are physically separated, the skilled reader would immediately see that a part of the electrical circuitry of that hearing aid could well be implemented in a separate processor, such as the PCB of an external electronic device (e.g. a smartphone).

The board emphasises in this respect that, within the art of hearing aids, the practice of outsourcing a computationally demanding signal processing part (e.g. relating to the improvement of speech intelligibility) to such an external device belonged (and still belongs) to the skilled reader's common general knowledge. The resonant element of the hearing aid as originally disclosed could then be implemented in the external part of the hearing aid (see e.g. Figure 6 of the opposed patent itself), which will not have the same ground potential as the transceiver of the hearing aid. Imposing nevertheless the limitation that they should have the *same* ground potential as mandated by **features (g) and (j)** indeed adds subject-matter in the sense that, for instance, the skilled reader would have to provide a dedicated wire connecting the ground potentials of the external device and the transceiver, which was not part of the original teaching of the opposed patent.

Alternatively, the hearing aid as originally disclosed can be implemented as a binaural configuration (see also lines 11 to 14 of page 4 of the patent's description as filed), in which the electrical circuitry is typically distributed over a left and a

right hearing-aid component, each having their own ground potential. As a mere example, one could think of the left hearing-aid component having the transceiver connected to a *first* ground potential and the right hearing-aid component having the resonant element connected to a *second* ground potential. Implementing **features (g) and (j)** in such a configuration would again require a wire connection between the first and the second ground potential, for which there is no disclosure in the underlying application as filed.

2.2.3 Appellant I's argument that signal processing, in particular noise cancellation, in a hearing aid would be difficult to implement in the presence of two *different* ground potentials could not convince the board: as pointed out by appellant II, the noise cancellation according to the application as filed is performed by a passive element (see also, for instance, lines 8 to 12 of page 10 as filed), which can be preconfigured and tuned to dampen a particular (fixed) noise frequency, regardless of any excess noise that may be produced by electromagnetic coupling between two different ground potentials.

2.3 In conclusion, claim 1 of the main request contains added subject-matter (Articles 100(c) and 123(2) EPC).

3. *Auxiliary requests: claim 1 - added subject-matter*

3.1 Claim 1 of **all auxiliary requests on file** comprises the same teaching as claim 1 of the main request concerning, on the one hand, the transceiver, the IC chip or radio and, on the other hand, the resonant element being connected to the same ground potential (cf. point 2.2.1 above).

3.2 During oral proceedings, claim 1 of **auxiliary requests 0A, 9A and 11A** was discussed in more detail, which, respectively, differs from claim 1 of the main request in that it further specifies that

(k) the antenna is configured to have a frequency of at least 1 GHz and the resonant element is suitable for radiating an electromagnetic field at frequencies greater than 1 GHz (**auxiliary request 0A**);

(l) the support substrate is a printed circuit board which has a first, top layer comprising at least a part of the electrical circuitry, a second, middle layer comprising the resonant element and a third, bottom layer comprising the ground plane (**auxiliary request 9A**);

(m) the wireless data communication is performed by an IC chip being a radio instead of by a transceiver (**auxiliary request 11A**).

3.2.1 Regarding **feature (k)**, the argument of appellant I that the use of a frequency of at least 1 GHz effectively couples all ground potentials of the hearing aid of claim 1 into one common ground potential at most applies if the hearing aid of claim 1 is in operation. Moreover, the mere suitability or configuration of some components of the hearing aid for using such a frequency range does not necessarily mean that this range is actually *used* in operation.

To test whether the requirement of Article 123(2) EPC is fulfilled, it must be ascertained, however, that there is a direct and unambiguous disclosure in the application as filed for all technically sensible

interpretations which would readily occur to the skilled reader. One viable interpretation for which there is no such disclosure is that the transceiver and resonant element must be coupled to the same physical ground potential, regardless of *whether or not* the hearing aid is in use. Moreover, it is doubtful that, even when in use at a frequency of at least 1 GHz, the external electrical device and the binaural configuration mentioned in point 2.2.2 above would rely on a single common ground potential for all of the use situations which could possibly be contemplated by the skilled reader.

- 3.2.2 Regarding **feature (1)**, appellant I referred to Figure 5 as filed, which, in their opinion, would show a hearing aid with electrical circuitry having a top layer with transceiver 5, a middle layer with the resonant element and a bottom layer acting as a ground plane and argued that the close distance between those three layers would render it impossible for the skilled reader to implement more than one ground potential.

In view of the phrase "comprising at least a part of the electrical circuitry" in feature (1), the board will assume, to appellant I's benefit, that the skilled reader would understand the PCB of feature (1) to be part of the subject-matter of claim 1. Even under this assumption, the board cannot see how the three layers shown in Figure 5 as filed could possibly change the conclusion reached for claim 1 of the main request in point 2.3 above. In particular, appellant II convincingly pointed out that there is not a single embodiment in the application as filed that indeed states that the transceiver and the resonant element are connected to the same ground potential. This is especially the case for the paragraph bridging pages 11

and 12 as filed describing the embodiment of original Figure 5.

Moreover, even if credible, the argument of appellant I would not apply to the external device and binaural configuration mentioned in point 2.2.2 above, where the different ground potentials are distributed over components that are physically separate.

3.2.3 Regarding **feature (m)**, the board sees no technical difference between an "IC chip being a radio" and a "transceiver". Appellant I confirmed that there was no such difference, but pointed towards Figure 3a as filed, where it was specifically shown that IC chip 5 is connected to ground potential 9. Appellant II, however, persuasively emphasised that original Figure 3a is schematic (cf. line 31 of page 10 as filed). In fact, this figure is a projection and, as such, does not directly and unambiguously show that resonant element 14 is connected to the *same* ground potential as IC chip 5. The same applies to Figure 2 as filed, where resonant element 13 is not necessarily connected to the *same* ground potential as IC chip 5.

While it is true that Figure 1 as filed shows resonant element 7 to be connected to ground potential 9, appellant II rightly mentioned that original Figures 1 and 2 describe *different* embodiments. The fact that these embodiments use the *same* reference numeral to denote the ground potential does not necessarily mean that they refer to the *same physical* ground potential: the reference numeral "9" could simply relate to the ground level of "0V" being the same for all ground potentials, even when they are physically not identical. Moreover, in Figure 1 as filed, transceiver 5 is not shown to be connected to any

ground potential 9.

Appellant I suggested in this respect that the skilled reader would know how to combine the embodiments of different figures and would, in particular, know which elements of which figures are combinable and which ones are not. It is, however, generally accepted that treating the disclosure of an application as a mere "reservoir" from which individually disclosed features could be combined in the absence of a pointer to the combination is not in line with the "gold standard" for assessing whether or not subject-matter has been added.

3.3 Moreover, while claim 1 of **auxiliary requests 13 and 14**, respectively, relates to original claims 5 and 15 rather than to original claims 1 and 5, it imposes the same limitation as mentioned in point 2.2.1 above. Therefore, the same reasoning applies, *mutatis mutandis*, as set out above for claim 1 of the main request.

3.4 As a result, claim 1 of all auxiliary requests on file, respectively, does not comply with Article 123(2) EPC either.

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