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**Datasheet for the decision
of 21 January 2022**

Case Number: T 0707/17 - 3.4.01

Application Number: 11165050.3

Publication Number: 2521221

IPC: H01Q9/00, H04R25/00, H04B1/00,
H04B5/00, H01Q1/27, H01Q7/00

Language of the proceedings: EN

Title of invention:

Receiver and method for retrieving an information signal from
a magnetic induction signal

Patent Proprietor:

Oticon A/S

Opponent:

Sivantos Pte. Ltd.

Headword:

Inductive receiver for hearing aid / Oticon

Relevant legal provisions:

EPC Art. 56

RPBA Art. 12(4)

Keyword:

Late-filed facts - submitted with the statement of grounds of appeal - considered (yes)

Auxiliary Request - submitted with the reply to the statement of grounds of appeal - considered (yes)

Auxiliary Request - inventive step - (yes)



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Case Number: T 0707/17 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 21 January 2022

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
3 February 2017 concerning maintenance of the
European Patent No. 2521221 in amended form.**

Composition of the Board:

Chairman P. Scriven
Members: A. Medeiros Gaspar
C. Almberg

Summary of Facts and Submissions

- I. This is an appeal by the opponent against the Opposition Division's decision to maintain European Patent 2521221 in amended form.
- II. On filing the opposition, the opponent submitted, as evidence in support of the invoked grounds of lack novelty and inventive step (Article 100(a) EPC), among others, the following documents:
- E1 EP 1996852 B1
 - E2 Andersson, *Multiband LNA Design and RF-Sampling Front-Ends for Flexible Wireless Receivers*, Institut of Technology Linköping University, 2006, ISBN 91-85523-22-4
 - E6 US7239713 B2
- III. The notice of opposition pursued novelty attacks based on documents E1 and E2, and inventive step attacks starting from E1, against all claims. E6 was only evoked as second document in an inventive step attack raised against granted claim 12.
- IV. One month ahead of the oral proceedings before the Opposition Division, the proprietor filed six auxiliary requests. During those oral proceedings, auxiliary request 2 was withdrawn; subsequent auxiliary requests were renumbered accordingly; and auxiliary request 3

was modified, in order to bring the method claim into line with the device claim.

V. The Opposition Division decided to maintain the patent on the basis of the modified auxiliary request 3, and provided reasons for their positive views on inventive step of that request in view of E1 combined with common general knowledge or E2; as well as in view of E2 combined with common general knowledge.

VI. On appeal, the opponent further pursues the inventive step attacks based on E1 and E2. In addition, two new novelty attacks are brought forward, one based on E6 and the other based on the new document E11; as well as a new inventive step attack combining E1 with E11.

E11 WO2011/010106 A1

VII. Further, four new documents (E12 to E15) were also submitted as proof of the skilled person's common general knowledge and the historical development of the state of the art.

VIII. In response, the proprietor noted the lateness of the submission based on document E6; requested that all new documents (E11 to E15) be disregarded, arguing their lack of *prima facie* relevance; and submitted eight auxiliary requests.

IX. The opponent argued that the auxiliary requests 1 - 6 and 8 should not be considered; and requested that the

appealed decision be set aside and that the patent be revoked.

X. At the end of the oral proceedings, the proprietor withdrew its main request and auxiliary requests 1 to 4, and requested that the appealed decision be set aside and that the patent be maintained on the basis of one of auxiliary requests 5 to 8.

XI. Claim 1 of auxiliary request 5 reads as follows (the underlining indicates the differences with regards to claim 1 of the patent as maintained):

A hearing device (15) adapted to be arranged at or in an ear (26) of an individual (27) and comprising a receiver (1) for retrieving an information signal from a magnetic induction signal comprising a carrier signal frequency or phase modulated in dependence on the information signal, the receiver (1) having a signal path (6) comprising:

- an antenna circuit (2) adapted to receive the magnetic induction signal when arranged in the reactive near-field of the magnetic induction signal and to provide a corresponding electric antenna signal;*
- an amplifier (3) adapted to amplify the electric antenna signal;*
- a digitiser (4) adapted to digitise the amplified signal, wherein the digitised signal comprises information about the phase and the frequency of the amplified signal; and*

- a digital demodulator (5) adapted to retrieve the information signal by demodulating the digitised signal to retrieve information from the phase and/or frequency of the amplified signal, characterised in that the antenna circuit (2) forms a band-pass filter and that the receiver (1) is adapted to retrieve the information signal without any frequency translation in the signal path (6) between the antenna circuit (2) and the digitiser (4).

XII. Claim 13 of auxiliary request 5 reads as follows:

A method for retrieving an information signal from a magnetic induction signal comprising a carrier signal frequency or phase modulated in dependence on the information signal, the method comprising:

- using a hearing device according to at least one of claims 1 to 10, and with the hearing device:
- receiving the magnetic induction signal in an antenna circuit (2) arranged in the reactive near-field of the magnetic induction signal and providing a corresponding electric antenna signal;
- amplifying the electric antenna signal;
- digitising the amplified signal, wherein the digitised signal comprises information about the phase and the frequency of the amplified signal;and
- retrieving the information signal by digital demodulation of the digitized

signal to retrieve information from the phase and/or frequency of the amplified signal,
characterised in that the antenna circuit (2) functions as a band-pass filter and that the electric antenna signal is not subjected to any frequency translation prior to digitising.

Reasons for the Decision

The invention

1. The invention relates to magnetic induction communication, which may be used for wireless communication between body-worn devices, such as hearing aids and auxiliary devices (paragraphs [0001] and [0002] of the patent).
2. Depending on the distance between the transmitting and receiving antennas, different behaviours of the electromagnetic field can be explored. Non-radiative, inductive coupling dominates in the reactive near-field, close to the transmitting antenna, while radiative behaviours dominate at greater distances, in the far-field. As a rule of thumb, the reactive near-field extends to about one sixth of a wavelength of the carrier signal, whereas the far-field starts at about two wavelengths (paragraph [0015]).
3. At the receiving antenna, signals from the near-field are considerably stronger than from the far-field.

Hence, communications using the reactive near-field are inherently resistant to interference from the far-field (paragraph [0016]).

4. To be processed digitally, received analogue signals must be converted to the digital domain. This can be done directly on the received radio-frequency signal ("RF-sampling"), but the high sampling rates required and size and power-supply constraints make this prohibitive. The alternative is to perform frequency translation prior to digitising, but this also faces a number of difficulties in terms of reduced flexibility and of the space required for the additional circuit components (paragraphs [0006] and [0007]).
5. According to the invention, the difficulties with RF-sampling are, in fact, manageable when transmission uses the reactive near field (paragraph [0014]). In this context, frequency or phase modulation is disclosed as advantageous (paragraph [0039]).

On consideration of the novelty attacks based on E6 and E11

6. The novelty attacks based on E6 and on E11 were raised for the first time in the statement of grounds of appeal.
7. Nothing of significance follows from the fact that E6 was filed with the notice of opposition, whereas E11 was only filed with the statement of grounds of appeal; because lack of novelty in view of E6 was first invoked in the statement of grounds of appeal.
8. Given that the auxiliary request found allowable by the Opposition Division resulted from a combination of

granted claims, both attacks could and should have been presented in the notice of opposition, or, at the latest, when the proprietor submitted the relevant request.

9. However, the Board also considers that the proprietor should have filed that request with its reply to the notice of opposition, rather than only shortly before the oral proceedings before the Opposition Division.
10. The Board further acknowledges that, in view of the timing of the request and of the preliminary opinion of the Opposition Division, it was only during the oral proceedings before the Opposition Division that developments led to the conclusion that the evidence provided by E1 and E2 was not sufficient to demonstrate it not to be allowable.
11. It was thus the procedural behaviour of both parties that led to the Board being confronted with facts and evidence brought forward for the first time with the statement of grounds of appeal.
12. In view of the above, and the fact that the maintenance of invalid patents is not generally in the public interest, the Board considers the *prima facie* relevance of the new facts and evidence to be the decisive criterion in this case.
13. The disclosure of E6 does not appear *prima facie* prejudicial to the patentability of claim 1 of the patent as maintained.
14. The reasons for this are that, even though
 - (a) E6 relates to hearing devices comprising a receiver for near field magnetic induction

communication, like those of the present invention (E6, abstract);

- (b) the receiver comprises a resonant antenna circuit that necessarily acts as a band-pass filter and a demodulator (E6, sole Figure; and column 3, lines 30-34); and
- (c) digitisation takes place between the amplifier 33 and the filter 34 (E6, column 2, lines 14-18),

it does not disclose that the digitisation is carried out *without prior frequency translation between the antenna circuit and the digitiser*. The disclosure of E6 is, in fact, rather vague as to the signal processing between amplifier 33 and the filter 34.

- 15. The opponent argued that the lack of frequency translation could be inferred from the fact that E6 does not mention any.
- 16. However the lack of explicit mention of a feature cannot be equated to the disclosure of its absence.
- 17. A feature that is well-known and routinely employed, such as frequency translation prior to digitisation in receivers such as those of the present invention and of E6, need not be explicitly mentioned. The skilled reader understands it to be there, unless there are clear reasons for believing that a deviation from the well known-practice might have been intended.
- 18. If the author of E6 had intended to communicate that digitisation was without, or prior to, any down-conversion, this would have been explicitly mentioned.
- 19. Therefore, it is apparent that E6 neither discloses nor hints at one of the limitations defined in the

characterizing portion of claim 1 of the patent as maintained.

20. Consequently, the novelty attack based on E6 lacks *prima facie* relevance.
21. There are, to the contrary, serious reasons to suspect that E11 might be prejudicial to novelty of claim 1 of the patent as maintained.
22. On the one hand,
 - (a) E11 relates to hearing devices comprising a receiver adapted for near field magnetic induction communication (E11, abstract; and page 1, lines 3-8) and
 - (b) the passages mentioned by the opponent (E11, Figure 5; and page 13, line 31 - page 14 line 30, further referring to Figure 3 and page 8, lines 1-9) do appear to disclose a hearing device comprising a receiver with all the features of claim 1 of the patent as maintained.
23. On the other hand, the arguments submitted by the proprietor as to why E11 would, *prima facie*, not prejudice the novelty of claim 1 as maintained, are not persuasive, in essence, because they rely on a limitation to frequency or phase modulation, which is not defined in the claim.
24. The proprietor argued that a *digitiser* as defined in the claim would mean something different from an analogue-to-digital converter. Both would convert signals from analogue to digital form. However, a digitizer would provide information about the phase and the frequency of the signal, but not about the

amplitude, whereas an analogue-to-digital converter, such as the one disclosed in E11, would necessarily provide information about the amplitude.

25. However, such an interpretation of the two terms is neither well-established in the art, nor disclosed in the patent. To the contrary, in paragraph [0007] of the patent, the two terms are used as synonyms.
26. The proprietor further argued that the limitations that *the antenna circuit acts as a band-pass filter* and that *the information signal is retrieved without frequency translation in the signal path* also implied that the signal needed to be modulated either in frequency or in phase.
27. However, a limitation to frequency or phase modulation does not result from those limitations either, and no such link is disclosed in patent.
28. Since what the proprietor argued as *prima facie* distinguishing claim 1 as maintained from the disclosure of E11 is not reflected in the claim, and the Board, at first glance, cannot identify any difference, the disclosure of E11 raises serious doubts as to the novelty of claim 1 as maintained and needs to be considered in-depth.
29. Therefore, the novelty attack based on E11 is to be considered, whereas the attack based on E6 is not.

On consideration of auxiliary request 5 and the further attacks based on E6 and E11

30. Having taken the decision to consider novelty in the light of E11, the proprietor can expect an opportunity to overcome the new issue.
31. Auxiliary request 5, succeeds in doing so, by limiting to frequency or phase modulation (see underlined wording under XII above), since E11 uses amplitude modulation (E11, page 3 lines 26-32; claim 1).
32. The opponent argues against consideration of this request, for the reason that it *prima facie* lacks an inventive step in view of E11, given that frequency or phase modulation were just as well known as amplitude modulation.
33. However, while it is true that frequency and phase modulation techniques were well known at the relevant date for this invention, the Board has doubts as to whether or not the skilled person would have considered replacing the amplitude modulation technique employed in E11, or for which purpose. In-depth consideration of the matter is, then, required before a definitive conclusion can be reached on whether the subject-matter of this request is inventive in view of E11 or not.
34. Given that the amendments introduced are straightforward and furthermore reflect limitations discussed in-depth in the context of novelty of the patent as maintained in view of E11, consideration of auxiliary request 5, as well as of the inventive step attacks based on E11 raised against it, do not place an undue additional burden on the Board or on the parties.

35. Therefore, auxiliary request 5 and the inventive step attacks against it based on E11 are to also be considered.
36. To the contrary, the novelty attack based on the disclosure of E6, also raised against this request, lacks *prima facie* relevance, for the same reasons as presented under paragraphs 13 to 20 above. Consequently it will not be further considered.

Auxiliary request 5: inventive step of claim 1 vis-à-vis E11

37. E11 discloses a hearing device comprising a receiver adapted for near field magnetic induction communication (E11, page 1, lines 3-8; page 13, lines 30-32; page 14, lines 21-23).
38. The receiver (E11, Figure 5; page 13, line 30 - page 14, line 2; page 14 lines 11-18 and page 7 line 30-page 8 line 15) comprises an antenna circuit (700), an amplifier (72), a digitiser (74), and a digital demodulator (page 8 lines 14-15, page 14 lines 20-23).
39. The antenna circuit receives amplitude modulated carrier signals (E11, page 7 lines 23-31) which are directly sampled at RF (page 14 lines 14-16 and page 8 lines 1-3).
40. The proprietor argues that the antenna circuit 700 of E11 does not form a band-pass filter as defined in the claim, since the term *band-pass filter* implied sharply distinguished pass and stop-bands, which the LC circuit of E11 did not have.

41. The Board, however, does not recognise the expression *band-pass filter* as implying anything about the shape of the frequency response, beyond there being a finite range in which signals pass and outside which they are significantly suppressed. The resonant circuit 700 depicted in figure 5 of E11 is tuned to the carrier frequency and fulfills that function (E11, page 14 lines 11-14).
42. The subject-matter of claim 1 of auxiliary request 5 differs, then, from the disclosure of E11 exclusively in that the modulated carrier signal received and demodulated is frequency or phase modulated, instead of amplitude modulated as in E11, and in that the digitiser and demodulator are, accordingly, adapted to retrieve the information signal from the frequency or phase of the carrier (see underlined passed under item XII above).
43. The opponent argues that frequency and phase modulation, like amplitude modulation, were well-known. Hence, the replacement of one by the other resulted in the implementation of a trivial alternative, in which no surprising technical effect or inventive step could be recognised.
44. The Board agrees that amplitude, frequency, and phase modulation techniques were well known, and that the skilled person would have been aware of the technical advantages and disadvantages associated with each of them. Depending on the circumstances and the intended results, one or the other would have been employed.
45. The use of frequency or phase modulation techniques, as opposed to amplitude modulation, were, for instance, recognised as reducing susceptibility to interference

or distortion. This is recognised in the patent (paragraph [0039]), as well as in E11 (page 2, lines 8-9).

46. The objective technical problem may, then, be regarded as being that of reducing the susceptibility of the hearing device of E11 to interference.
47. The skilled person, starting from the disclosure of E11 and seeking to reduce signal susceptibility to interference would have considered employing frequency or phase modulation, instead of amplitude modulation, given that these were well known solutions to said problem.
48. However, E11 explicitly teaches that frequency and phase modulation were unsuitable for small receiver units, such as those employed in hearing aids, due to significant disadvantages in terms of size (page 2, lines 10-12).
49. In view of this teaching in E11, the skilled person would have rejected frequency and phase modulations as viable solutions.
50. Instead, the approach taught in E11, of combining vestigial sideband amplitude modulation with a carrier signal of less than 100kHz, possibly further reducing the carrier frequency or more narrowly tuning receiver antenna circuit, would probably have been further explored (E11, page 10, line 27 - page 11, line 9; and page 11, lines 20-23).
51. Therefore, the claim 1 of auxiliary request 5 entails an inventive step in view of the disclosure of E11.

Auxiliary request 5: inventive step of claim 1 vis-à-vis E1 and the combination with E2 or E11

52. E1 discloses a hearing aid comprising a module with a receiver adapted to receive a modulated magnetic induction signal (E1, paragraphs [0007], [0018] and [0033])
53. The receiver (E1, Figure 5, *second module 52; paragraphs [0034] and [0035]*) comprises an antenna circuit 30 and a demodulator 55. The antenna circuit is tuned to the carrier signal, which is about 30 MHz. The demodulator passes the demodulated signals, via an amplifier, to an in-ear loudspeaker.
54. E1 does not disclose how the carrier signal is modulated, nor any details of the demodulator. It does not discuss any of the elements possibly interposed between the antenna circuit and the demodulator, and so does not disclose an amplifier and a digitiser as defined in the claim. Additionally, E1 is silent as to whether frequency translation occurs, or not, in the signal path between the antenna circuit and the digitiser.
55. The skilled person was, then, left to implement the modulation and demodulation of the carrier signal, as well as the signal path between the antenna circuit and the demodulator as seen fit.
56. Even though frequency or phase modulation, amplification, and digital demodulation would have been obvious options, direct RF-sampling at such a high frequency would not.

57. The disclosure of section 3.6 of E2 does not help the opponent, since it teaches the skilled person away from a direct RF-sampling for the reasons outlined in paragraph [0007] of the patent (E2, section 3.6).
58. A combination of the disclosure of E1 with that of E11 is not likely to have been something the skilled person would have considered, in view of the difference between the carrier frequencies (30MHz in E1, and less than 100kHz in E11). But even if the combination were considered, the result would have involved amplitude modulation as in E11, and not frequency or phase modulation as defined in claim 1 of auxiliary request 5.
59. Therefore, claim 1 of the auxiliary request 5 would not have been obvious in view of the teaching of E1, even in combination with E2 or E11.

Auxiliary request 5: inventive step of claim 1 vis-à-vis E2

60. The disclosure of figure 3.9 and pages 45 - 47 of E2 is not a reasonable starting point for an inventive step attack against claim 1 of auxiliary request 5.
61. E2 teaches, in the general context of RF communications, that direct sampling and digital demodulation can be advantageous, even though it may involve issues with power consumption. It teaches neither its use for near-field magnetic induction communication, nor its application to hearing devices.
62. The opponent argued that, even if, at the publication date of E2 (2006), near-field communication technology was still at an early stage of development; five years

later, at the relevant date for the present invention, near-field communication technology was routinely employed and part of the common general knowledge of the skilled person in the field of wireless communications. At that time, such technology was even already being employed in hearing devices.

63. That that was the case is contested neither by the proprietor nor by the Board. There is hence no need to consider the documents submitted by the proprietor as proof (E12 to E15).
64. Nevertheless, it is not apparent to the Board how the skilled person, starting from the general disclosure of E2, would, without hindsight, have come to consider implementing a hearing device comprising a receiver adapted for near-field magnetic induction communication.
65. The argumentation of the opponent appears to be built on a succession of steps. First, the skilled person had to extrapolate the teaching of E2 to near-field communication; and then to consider applications for which this new technology could be particularly useful. Such an approach is not free of hindsight.
66. But the situation is even worse, because E2 suggests that direct RF-sampling is unsuitable for applications in which size and power-consumption are important factors (D2, section 3.6).
67. Therefore, claim 1 of the auxiliary request 5 would not have been obvious in view of the teaching of E2 in combination with common general knowledge.

Auxiliary request 5: claim 13

68. Claim 13 defines a method for retrieving an information signal from a magnetic induction signal using the hearing device of claim 1. It is, hence, new and entails an inventive step in view of the disclosures of E1, E2, and E11 for the same reasons as presented for claim 1.

Conclusion

69. Given that the contested decision does not apply to auxiliary request 5, it has to be set aside.
70. Given that none of the attacks brought forward against auxiliary request 5 is successful, the patent can be maintained on basis of it.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of the claims of auxiliary request 5 submitted with the reply to the appeal, the drawings of the patent specification, and the description amended as necessary.

The Registrar:

The Chair:



D. Meyfarth

P. Scriven

Decision electronically authenticated