BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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

Datasheet for the decision of 3 August 2006

Case Number: T 0963/05 - 3.5.03

Application Number: 94914124.6

Publication Number: 0664071

IPC: H04R 25/00

Language of the proceedings: EN

Title of invention:
HEARING AID HAVING A MICROPHONE SWITCHING SYSTEM

Patentee:
ETYMOTIC RESEARCH, INC

Opponent:
K/S HIMPP (Hearing Instrument Manufacturers Patent Partnership)

Headword:
Hearing aid/ETYMOTIC RESEARCH

Relevant legal provisions:
EPC Art. 56
RPBA Art. 10b

Keyword:
"Late-filed auxiliary request - not admitted"
"Inventive step - main request, second and third auxiliary request (no), fourth auxiliary request (yes)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0963/05 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 3 August 2006

Appellant: (Opponent)
K/S HIMPP (Hearing Instrument Manufacturers Patent Partnership)
Ny Vestergaardsvej 25
DK-3500 Vaerlose (DK)

Representative:
Betten & Resch
Patentanwälte
Theatinerstrasse 8
D-80333 München (DE)

Respondent: (Patent Proprietor)
ETYMOTIC RESEARCH, INC
61 Martin Lane
Elk Grove Village, IL 60007 (US)

Representative:
Hitchcock, Esmond Antony
Lloyd Wise
Commonwealth House
1-19 New Oxford Street
London WC1A 1LW (GB)

Decision under appeal:
Decision of the opposition division of the European Patent Office posted 13 May 2005 rejecting the opposition filed against European patent No. 0664071 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: F. van der Voort
R. Moufang

Summary of Facts and Submissions

I. This appeal is against the decision of the opposition division rejecting an opposition filed against European patent No. EP 0 664 071 which is based on European patent application 94 914 124.6 which was published as international application WO 94/24834 A pursuant to Article 158(1) EPC. The opposition was filed against the patent as a whole and on the grounds that the claimed subject-matter was not new and did not involve an inventive step (Article 100(a) EPC).

II. The opponent (appellant) filed an appeal against the decision and requested that the impugned decision be set aside and the patent be revoked in its entirety. In the statement of grounds the appellant argued that the subject-matter of all claims as granted lacked an inventive step. Oral proceedings were conditionally requested.

III. In response to the notice of appeal the respondent (proprietor) filed a reply and argued that the appeal should be dismissed. Oral proceedings were conditionally requested.

IV. The parties were summoned by the board to oral proceedings. In a communication accompanying the summons, the board gave a preliminary opinion.

V. In preparation of the oral proceedings, the appellant filed further arguments in support of the alleged lack of inventive step.

VI. In response to the board's communication, the respondent filed with a letter dated 3 July 2006 four auxiliary requests.

VII. Oral proceedings were held on 3 August 2006. In the course of the oral proceedings, the respondent filed claim 1 of a new first auxiliary request. Two of the auxiliary requests on file were withdrawn and the remaining ones renumbered as second to fourth auxiliary requests.

The appellant requested that the decision under appeal be set aside and the patent be revoked in its entirety.

The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the decision under appeal be set aside and the patent maintained in amended form on the basis of claim 1 of a first auxiliary request filed at the oral proceedings or claims 1 to 16 of a second auxiliary request filed with the letter of 3 July 2006 as "Fourth Auxiliary Request" or claims 1 to 12 of a third auxiliary request filed with the letter of 3 July 2006 as "First Auxiliary Request" or claims 1 to 11 of a fourth auxiliary request filed with the letter of 3 July 2006 as "Second Auxiliary Request".

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

VIII. The following documents cited in the course of the opposition and/or appeal proceedings are relevant to the present decision:

D1: US 3 875 349 A;

D2: EP 0 499 699 A;

D3: US 4 399 327 A;

D5: US 5 121 426 A;

D13: "EB Directional Hearing Aid Microphone Application Notes", Knowles Electronics, Inc., Technical Bulletin TB21, pages 1/8 to 8/8; and

D26: "Electronic Response Shaping of Directional Microphones", Knowles Electronics, Inc., Technical Bulletin TB16, pages 1/2 and 2/2.

IX. Claim 1 as granted and claim 1 of the second auxiliary request are identical and read each as follows:

"Hearing aid apparatus comprising an omnidirectional microphone (15) and a directional microphone (20), both for converting sound waves to electrical signals; and a hearing aid amplifier (60) for amplifying electrical signals received at an input thereof,
CHARACTERIZED IN THAT
the directional microphone (20) is of at least the first order for converting sound waves into electrical signals having low, mid, and high frequency components,
AND BY

an equalization amplifier (40) having an equalized electrical signal output, for accepting electrical signals from the directional microphone for at least partially equalizing the amplitude of said low frequency electrical signal components with the amplitude of said mid and high frequency electrical signal components; and

switch means (55) for switching between a first state connecting the electrical signal from the omnidirectional microphone (15) to the input of the hearing aid amplifier (60) and a second state connecting the signal from the equalization amplifier (40) to the input of the hearing aid amplifier (60)".

Claim 1 of the first auxiliary request is identical to claim 1 as granted, except for the replacement of "an equalization amplifier (40)" by "an equalization amplifier circuit (40) including an inverting amplifier (125)".

Claim 1 of the third auxiliary request differs from claim 1 as granted in that the first characterising feature is replaced by:

"the directional microphone (20) is a second order directional microphone for converting sound waves into electrical signals having low, mid, and high frequency components, and comprises:

a first order directional gradient microphone (290) and an adjacent further first order directional gradient microphone (295), both having first and second spaced apart sound ports, at which received sound waves are converted to an electrical signal output;

a subtracter circuit (300) for electrically subtracting a said electrical signal of the first order directional microphone (290) from a said electrical signal output of the further first order directional microphone (295) to generate said electrical signal of the second order directional microphone;".

Claim 1 of the fourth auxiliary request is identical to claim 1 of the third auxiliary request, except for the insertion of the following feature between "an electrical signal output;" and "a subtracter circuit (300)":

"wherein the second sound port of the first order directional microphone and the first sound port of the further first order microphone are joined together to form a common sound port;".

Claims 2 to 11 of the fourth auxiliary request are dependent claims.

Reasons for the Decision

1. *Documents D13 and D26*

Documents D13 and D26 are not dated. However, neither in writing nor during the oral proceedings before the board did the respondent dispute that these documents were published before the priority date of the patent in suit; the board is satisfied that they are part of the state of the art in accordance with Article 54(2) EPC.

2. *Admissibility of the first auxiliary request*

2.1 The first auxiliary request was filed during the oral proceedings before the board. In accordance with Article 10b of the Rules of procedure of the Boards of Appeal (OJ EPO 3/2003, pages 89 to 98) any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the board's discretion.

2.2 Compared to claim 1 as granted, claim 1 of the first auxiliary request additionally specifies that the equalization amplifier is an equalization amplifier circuit including an inverting amplifier.

2.3 The respondent argued that the amendment was based on Fig. 7, which showed an equalizer circuit 40 including an inverting amplifier 125. However, the board notes that the claim does not define the specific circuitry which defines the equalizer circuit 40 as shown in Fig. 7 and which includes the inverting amplifier 125, resistors 130, 135, and capacitor 140, see also page 17, lines 18 to 24, of the application as published. The board accordingly has doubts as to whether this amendment satisfies the requirements of Article 123(2) EPC.

2.4 Further, it appears that the use of operational amplifiers in audio amplifier circuits suitable for small-size applications, such as in hearing aids, was well-known at the priority date of the patent in suit. Such amplifiers have a non-inverting input, an inverting input and an output. Since, for the reasons set out at point 3 below, the subject-matter of claim 1

as granted does not involve an inventive step, it follows that, at least *prima facie*, the subject-matter of claim 1 of the first auxiliary request would also lack an inventive step.

2.5 In view of the above, in exercising its discretion pursuant to Article 10b RPBA, the board decided not to admit the first auxiliary request.

3. *Main request - inventive step*

3.1 The appellant argued, *inter alia*, that the subject-matter of claim 1 as granted did not involve an inventive step having regard to the disclosure of D1 and taking into account the teaching of D26.

3.2 Since D1 relates to a hearing aid apparatus, the board accepts that D1 may be taken as representing the closest prior art. More specifically, D1, see in particular Fig. 1, discloses a hearing aid including switching means 17 for switching between two microphones 11 and 12, one having an omnidirectional and the other having a first-order directional characteristic, see col. 2, line 61 to col. 3, line 1 and col. 4, lines 35 to 62.

3.3 It was common ground between the parties that the subject-matter of claim 1 as granted differed from the hearing aid disclosed in D1 in that the claimed apparatus further included an equalization amplifier having an equalized electrical signal output, for accepting electrical signals from the directional microphone for at least partially equalizing the amplitude of the low frequency electrical signal

components with the amplitude of the mid and high frequency electrical signal components.

3.4 The technical effect achieved by the equalization amplifier is therefore a reduction in the differences between the low-, mid-, and high-frequency responses of the directional microphone. In practice, this results in a reduction in differences between the frequency response of the directional microphone and that of the omnidirectional microphone, since the latter normally has an overall flat frequency response, whereas the former has a distinctly decreased sensitivity at low frequencies (cf. paragraphs [0006] and [0020] and Fig. 3 of the patent specification).

3.5 The objective problem underlying the invention as defined by claim 1 when starting out from D1 may therefore be seen in improving the known hearing aid such as to reduce changes in the tone balance when switching between the omnidirectional microphone and the directional microphone. The formulation of this problem does not contribute to an inventive step, since differences in tone balance would immediately be recognized simply by using the known hearing aid in practice.

3.6 In the board's view the skilled person faced with the above-mentioned objective problem would consider D26, since it relates to equalizing frequency response differences between omnidirectional and directional microphones. At page 1, left-hand column, second and third paragraphs, the frequency response characteristic of omnidirectional microphones is said to be essentially flat, whereas the forward response of

directional microphones is said to have a 6 dB per octave rising characteristic. Further, it is stated that in many applications it may be desirable to flatten or equalize the frequency response of the directional microphone electronically, which may be achieved by means of a resistor/capacitor compensating network. As shown in D26, Fig. 1, an at least partial equalization of the amplitude of the low frequency signal components with the amplitude of the mid and high frequency signal components is achieved by the compensating network. From page 1, left-hand column, third paragraph ("*a resistor/capacitor compensating network in the amplifier chain*"), page 2, left-hand column, first and last sentences ("*an appropriate point in the amplifier circuitry*"), and Fig. 4 ("*preceeding circuit stages*" and "*following circuit stages*"), it follows that the compensating network is connected in the amplifier circuitry connected to the directional microphone.

3.7 The respondent accepted that D26 would have been considered by the skilled person in the hearing aid art since it was a technical bulletin issued by a company which, according to the respondent, was a well-known manufacturer of hearing aid microphones. It was argued however that D26 merely taught the use of an attenuator, namely a passive low-pass filter consisting of a resistor/capacitor compensating network to flatten the frequency response of the directional microphone, whereas the claimed hearing aid apparatus included an equalization amplifier.

The board does not accept this argument, since D26 explicitly discloses that the compensating network is

connected in the amplifier circuitry of the directional microphone (see point 3.6 above). The combination of the compensating network and the amplifier circuitry therefore results in both an equalization and an amplification of the directional microphone signal. The equalization amplifier of claim 1 reads on the above combination as described in D26, since claim 1 does not define any constructional features of the equalization amplifier.

3.8 Starting out from D1 and faced with the above-mentioned technical problem, the person skilled in the art would therefore apply the teaching of D26 to the hearing aid of D1 by connecting the directional microphone 12 to an equalization amplifier as taught by D26 and thereby, without the exercise of any inventive skill, arrive at an hearing aid apparatus including all the features of claim 1.

3.9 The subject-matter of claim 1 as granted therefore lacks an inventive step (Articles 52(1) and 56 EPC).

3.10 The main request is therefore not allowable.

4. *Second auxiliary request - inventive step*

Claim 1 of the second auxiliary request is identical to claim 1 of the main request. Hence, for the same reasons as set out at point 3 above, the second auxiliary request is not allowable.

5. *Third auxiliary request - inventive step*

5.1 Claim 1 of the third auxiliary request differs from claim 1 as granted in that the directional microphone is a second-order directional microphone which is composed of two first-order directional gradient microphones and a subtractor circuit as defined in the claim. This feature together with the equalization amplifier (see point 3.3 above) distinguishes the subject-matter of the claim from the hearing aid as disclosed in D1.

5.2 In the board's view, the claim thereby defines an collocation of features, in which the technical problem underlying the claimed subject-matter when starting out from D1 consists of two separate partial problems; a first partial problem may be seen in improving the known hearing aid such as to reduce changes in the tone balance when switching between the omnidirectional and the directional microphone (see point 3.5 above) and a second in further improving the directional sensitivity of the directional microphone.

5.3 The formulation of these partial problems does not contribute to an inventive step for the reasons set out at point 3.5 above as regards the first partial problem, and because, as regards the second partial problem, it was well-known at the priority date that a second-order directional microphone provided a higher directional sensitivity than a first-order directional microphone; indeed, at the oral proceedings this was common ground between the parties.

5.4 The board moreover notes that D1 states that the use of a microphone having a pronounced directional characteristic is advantageous during a normal conversation between the hearing aid user and another person (col. 1, lines 14 to 26). Further, D1 describes a mechanical solution for increasing the directional characteristic of the first-order directional microphone (col. 2, lines 33 to 37). It follows that D1 already acknowledges the desirability of providing a microphone having a pronounced directional characteristic in a hearing aid.

5.5 At the oral proceedings it was also common ground that a second-order directional microphone, composed of two spatially separated first-order directional gradient microphones and a subtractor, was well-known at the priority date. The appellant referred in this respect to D2 and to D5 at col. 6, lines 5 to 63 and Figs 6 to 8.

5.6 The respondent argued that D5 did not relate to a hearing aid and that even though it might have been obvious in theory to combine two first-order directional gradient microphones such as to achieve a second-order directional microphone, it would not have been obvious to subsequently apply it to a hearing aid. The board notes however that D5 refers to a document (D13) which relates to hearing aids (see D5, cover page and col. 3, line 66 to col. 4, line 2) and that from D2, which relates to a hearing aid, it is known to combine two directional microphones in order to increase the directional effect (col. 4, lines 20 to 23). In the board's view these disclosures suggest that at the very

least there was no prejudice against the inclusion of a second-order directional microphone in a hearing aid.

5.7 It would therefore have been obvious to the person skilled in the art starting out from D1 and faced with the above-mentioned second partial problem to replace the first-order directional microphone 12 of D1 by a second-order directional microphone, if greater directionality was desired.

5.8 For these reasons and the reasons given above in respect of claim 1 as granted (see point 3) the board concludes that the subject-matter of claim 1 of the third auxiliary request does not involve an inventive step (Articles 52(1) and 56 EPC). The third auxiliary request is therefore not allowable.

6. *Fourth auxiliary request - amendments*

6.1 Claim 1 of the fourth auxiliary request is based on claim 1 and claims 12 to 14 as originally filed. Dependent claims 2 to 9 are based on claims 2 to 5, 8 to 11, respectively, as well as on Fig. 20 and the corresponding passage in the description as originally filed (page 29, line 13 to page 31, line 8), this passage also providing a basis for the features of dependent claims 10 and 11.

6.2 Further, claim 1 corresponds to a combination of claims 1, 10 and 11 as granted, in which claim 11 as granted was dependent on claim 10 as granted, which in turn was dependent on any of the preceding claims 1 to 9 as granted. Claims 2 to 11 of the fourth auxiliary

request respectively correspond to claims 2 to 9, 12 and 13 as granted, which were renumbered accordingly.

6.3 The appellant did not invoke the opposition ground pursuant to Article 100(c) EPC and did not raise any objections under Article 123 EPC in respect of the amendments introduced by the fourth auxiliary request.

6.4 The board is satisfied that the claims of the fourth auxiliary request do not contain subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC) and that the claims as granted have not thereby been amended in such a way as to extend the protection conferred (Article 123(3) EPC).

7. *Fourth auxiliary request - inventive step*

7.1 Compared to claim 1 of the third auxiliary request, claim 1 of the fourth auxiliary request additionally defines that the second sound port of the first-order directional microphone and the first sound port of the further first-order microphone are joined together to form a common sound port. As indicated above, this feature was claimed in claim 11 as granted and in claim 14 as originally filed.

7.2 In the course of the appeal proceedings, the only arguments submitted by the appellant in relation to the question of whether or not the above additional feature contributed to an inventive step were that joining together a second sound port of a first directional microphone with a first sound port of a second directional microphone was an obvious design choice for small-sized device like a hearing aid and that joined

sound ports were known from D1, col. 4, lines 9 and 10 and Fig. 5.

7.3 These arguments do not however convince the board. In the absence of any evidence in support, the argument that the feature is an obvious design choice is merely an assertion. The board is not aware of any prior art document on file, irrespective of whether or not it relates to hearing aids, which discloses a second-order microphone including the above-mentioned additional feature; the appellant was unable to produce such a document. In particular with respect to D5, which was discussed during the oral proceedings, the board notes that the embodiment of a speakerphone as shown in Fig. 17 (see also col. 8, lines 42 to 52) does not disclose or suggest joining together, in the sense of the patent in suit, two of the sound ports of the first-order microphones 200-1 and 200-2 (see D5, Fig. 6). The appellant also referred to D3, which shows two spaced apart first-order microphones 1a, 1c, forming a second-order microphone, but these do not have sound ports which are joined together to form a common sound port (see Figs 1 and 16).

With respect to D1 the board notes that Fig. 5 discloses a common housing which is subdivided by a partition wall in two compartments, one with one sound inlet opening 31 and accommodating the omnidirectional microphone 11 and the other with two sound inlet openings 32, 35 and accommodating the directional microphone 12. A common sound inlet funnel 33 is arranged forwardly of both sound inlet openings 31 and 32.

If this teaching of D1 were applied to a hearing aid corresponding to that of D1 but in which, in accordance with present claim 1, the directional microphone 12 is replaced by a second-order directional microphone, the sound inlet funnel 33 would be commonly shared by the omnidirectional microphone 11 and the second-order directional microphone and, hence, not by the two first-order directional microphones, which define the second-order directional microphone, as defined in the claim. The board cannot see any reason why the skilled person would subsequently make the necessary modifications, i.e. providing a common sound port for the two first-order directional microphones; nor was the appellant able to suggest a convincing reason why the skilled person would do so.

7.4 It follows that the subject-matter of claim 1 is not rendered obvious having regard to the available prior art documents and taking into account the arguments presented by the appellant.

7.5 The fourth auxiliary request is therefore allowable.

Order

For these reasons it is decided that:

8. The decision under appeal is set aside.

9. The case is remitted to the first instance with the order to maintain the patent on the basis of claims 1 to 11 of the fourth auxiliary request and a description to be adapted.

The Registrar: The Chairman:

D. Magliano A. S. Clelland