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**Datasheet for the decision
of 9 September 2008**

Case Number: T 1066/06 - 3.5.03

Application Number: 98307085.5

Publication Number: 0901308

IPC: H04R 1/08

Language of the proceedings: EN

Title of invention:

Integral holder-connector for capacitor microphone

Applicant:

SHIN-ETSU POLYMER CO., LTD.

Opponent:

-

Headword:

Holder-connector for microphone/SHIN-ETSU

Relevant legal provisions:

EPC Art. 56, 113(1)

EPC R. 115(2)

RPBA Art. 15(3)

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step - no"

"Oral proceedings held in absence of appellant"

Decisions cited:

-

Catchword:

-



Case Number: T 1066/06 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 9 September 2008

Appellant:

SHIN-ETSU POLYMER CO., LTD.
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Representative:

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 17 February 2006
refusing European application No. 98307085.5
pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: A. S. Clelland
Members: T. Snell
M.-B. Tardo-Dino

Summary of Facts and Submissions

- I. This appeal is against the decision of the examining division refusing European patent application No. 98307085.5, with publication number EP-A-901308.

The refusal was based *inter alia* on the ground that the subject-matter of claim 1 did not meet the requirement of novelty pursuant to Article 52(1) in combination with Articles 54(1) and (2) EPC with respect to the disclosure of the following document:

D1: WO-A-95/27323

- II. The appellant filed a notice of appeal against the above decision. A new claim set as a main request (claims 1-9) and five alternative claim sets as "auxiliary claims I" to "auxiliary claims V" were subsequently filed together with a statement of grounds of appeal.

In the statement of grounds, the appellant requested that the decision under appeal "be revoked and that the Application be remitted to the Examining Division with an order to grant a patent on the basis of the claims filed herewith and with an adapted description".

Oral proceedings were conditionally requested.

- III. In a communication accompanying a summons to oral proceedings the board gave a preliminary opinion in which objections under Articles 123(2), 84, and 52(1) in combination with Article 56 EPC were raised against the claims of various of the requests.

In addition to D1, the board referred *inter alia* to the following document:

D3: US-A-5403194

The board referred also to common general knowledge, citing what the board considered to be a commonly known hardness scale.

- IV. In response to the board's communication, the appellant filed four new claim sets as a main request (claims 1-9), a "second auxiliary request" (claims 1-5), a "third auxiliary request" (claims 1-5) and a "fourth auxiliary request" (claims 1-5). These auxiliary requests are identical to each other.
- V. Oral proceedings were held on 09.09.08 in the absence of the appellant, the board having confirmed in a telephone call to the representative's office at the start of the oral proceedings that the appellant would not be represented.

The board understood from the appellant's written submissions that it requested that the decision be set aside and a patent granted on the basis of claims 1-9 of the main request filed on 11.08.08 with the letter of response to the summons to oral proceedings. The board inferred that, if the main request were deemed not allowable, grant was alternatively requested on the basis of the following auxiliary requests:

First auxiliary request: "Auxiliary claims I", filed
16.06.06.

Second auxiliary request: "Second auxiliary request",
filed 11.08.08.

Third auxiliary request: "Third auxiliary request",
filed 11.08.08.

Fourth auxiliary request: "Fourth auxiliary request",
filed 11.08.08.

Fifth auxiliary request: "Auxiliary claims V", filed
16.06.06.

The board also inferred that all requests included the pages of the description and the sheets of drawings currently on file, namely:

Description: pages 1-16 filed 15.03.04.

Drawings: Sheets 1/9 - 9/9 as originally filed.

After due deliberation, the board's decision was announced at the end of the oral proceedings.

VI. Claim 1 of the appellant's main request reads as follows:

"An integral microphone holder-connector (1) for mounting a capacitor microphone on an instrument which is an integration of a microphone holder for holding and positioning the capacitor microphone, and a connector body (2) made from rubbery material for electrically connecting the electrode terminals of the microphone held within the cavity of the microphone

holder and electrode terminals on an *[sic]* circuit board *characterised in that* the microphone holder is made from a non-conducting rubbery material in the form of a wall for holding and positioning the capacitor microphone within the cavity thereof and a connector body (2) integrated with the microphone holder at the bottom to together form microphone holder *[sic]* having a cavity."

Claim 1 of the first auxiliary request reads as follows:

"An integral microphone holder-connector (1) for mounting a capacitor microphone on an instrument which is an integration of a microphone holder for holding and positioning the capacitor microphone, and a connector body (2) for electrically connecting the electrode terminals of the microphone held within the cavity of the microphone holder and electrode terminals on an outer circuit board *characterised in that* the microphone holder is made from a rubbery material having a relatively low electrolyte content in the form of a cup with a cavity for holding and positioning the capacitor microphone within the cavity thereof and a connector body (2) integrated to form the bottom of the cup-formed microphone holder."

Claim 1 of the second to fourth auxiliary requests reads as follows:

"An integral microphone holder-connector (1) for mounting a capacitor microphone on an instrument which is an integration of a microphone holder for holding and positioning the capacitor microphone, and a

connector body (2) made from rubbery material for electrically connecting the electrode terminals of the microphone held within the cavity of the microphone holder and electrode terminals on an circuit board, the microphone holder is [*sic*] made from a non-conducting rubbery material in the form of a wall for holding and positioning the capacitor microphone within the cavity thereof and a connector body (2) integrated with the microphone holder at the bottom to together form microphone holder [*sic*] having a cavity, *characterised in that* the connector body (2) is a member consisting of a connector base made from a rubbery material and metal wires (4) each having a diameter in the range from 5 to 100 μm embedded therein in a parallel alignment running in the direction approximately perpendicular to the bottom of the cup-formed microphone holder, and the rubbery material of the microphone holder is a silicone rubber having a rubber hardness in the range from 20 to 80 DEG H in the JIS scale and a permanent compression set not exceeding 20%."

Claim 1 of the fifth auxiliary request reads as follows:

"An integral microphone holder-connector (1) for mounting a capacitor microphone on an instrument which is an integration of a microphone holder made from a rubbery material having an electrolyte in a content as low as possible in the form of a cup with a cavity for holding and positioning the capacitor microphone within the cavity thereof and a connector body (2) integrated to form the bottom of the cup-formed microphone holder for electrically connecting the electrode terminals of

the microphone held within the cavity of the microphone holder and electrode terminals on an outer circuit board *characterised in that* the connector body (2) is a member consisting of a connector base made from a rubbery material and metal wires (4) each having a diameter in the range from 5 to 100 µm embedded therein in a parallel alignment running in the direction approximately perpendicular to the bottom of the cup-formed microphone holder, and the rubbery material of the microphone holder is a silicone rubber having a rubber hardness in the range from 20 to 80 DEG H in the JIS scale and a permanent compression set not exceeding 20%."

Reasons for the Decision

1. *Procedural matters*
- 1.1 The board appointed oral proceedings in accordance with Article 116(1) EPC following a request from the appellant. Having verified that the appellant was duly summoned and confirmed by telephone that it would not be represented at the oral proceedings, the board decided to continue the oral proceedings in the absence of the appellant (Rule 115(2) EPC).
- 1.2 In accordance with Article 15(3) RPBA, the board shall not be obliged to delay any step in the proceedings, including its decision, by reason only of the absence at oral proceedings of any party duly summoned who may then be treated as relying only on its written case.
- 1.3 Under these circumstances, the board considered that all necessary measures to respect the appellant's right

to be heard under Article 113(1) EPC had been taken. The board was therefore in a position to issue its decision.

2. *The appellant's requests*

With its latest submission, the appellant filed a new main request and three further (identical) requests entitled respectively "second auxiliary request", "third auxiliary request" and "fourth auxiliary request". The appellant commented that "each set of claims has been amended to now specify that the holder connector (1) is made of rubbery material, [and] to remove reference to 'in the form of a cup', and 'outer' from the phrase 'outer circuit'". The appellant stated further "... we have not reproduced the original 2nd and 3rd auxiliary requests".

The board understands from this submission that the statement "each set of claims has been amended" refers only to the sets of claims newly filed, and not to the first and fifth auxiliary requests still on file. The board infers that the new main request and the second, third and fourth auxiliary requests are intended to replace the existing main request and the second, third and fourth auxiliary requests respectively, and that the first and fifth auxiliary requests are intended to be considered as filed with the statement of grounds.

3. *Articles 84 and 123(2) EPC*

Although questions remain as to whether certain claims of the various requests meet the requirements of Articles 84 and 123(2) EPC, the board is in a position

to interpret claim 1 of each request in order to permit an assessment of the claimed subject-matter as to novelty and inventive step.

4. *Novelty and inventive step - Article 52(1) EPC*

4.1 The invention concerns an integral rubber holder-connector for mounting a capacitor microphone and for connecting the microphone electrically to a circuit board. The invention finds application for example in mobile phones.

4.2 In the view of the board, document D1 represents the closest prior art.

D1, on page 7, lines 16-28 in combination with associated figure 9, discloses an integral microphone holder-connector for mounting a capacitor microphone 15 on an instrument.

The holder-connector of this embodiment is an integration of a microphone holder 16 for holding and positioning the capacitor microphone (cf. page 7, lines 20-21, "A gasket 16 is formed as an integral part of the elastomeric connector"; lines 26-28, "This solution has several advantages in that the elastomer provides ... a holder for a microphone ... as well as a gasket"), and a connector body 13 made from rubbery material (element 13 is a central cylinder which forms one conducting path, cf. lines 22-23, and comprises "an electrically conductive elastomer, for example silicon (*sic*) containing silver or copper pellets, cf. lines 19-20). Further, the holder-connector is arranged for electrically connecting the electrode terminals of

the microphone 15 held within the cavity of the microphone holder and electrode terminals on a circuit board 17 (cf. lines 21-23, "the elastomeric connector ... comprises a central cylinder, forming the first conducting path 13 surrounded by a coaxial tube, forming the second conducting path 14").

4.3 *The main request*

4.3.1 In view of the above, the board concludes that D1 discloses all the features of the preamble of claim 1 according to the main request.

4.3.2 With respect to features of the characterising portion of claim 1, D1 discloses that the microphone holder is made from a rubbery material (cf. page 7, lines 19-20) in the form of a wall with a cavity for holding and positioning the capacitor microphone within the cavity thereof and a connector body integrated with the microphone holder at the bottom. In this respect, using figures 2A-2C and 4 of the present application to help interpret the expressions "in the form of a wall", "within the cavity thereof" and "integrated with the microphone holder at the bottom", the gasket 16 in figure 9 of D1 forms a cylindrical wall enclosing a cavity for holding the microphone 15, and element 13 forms a connector body integrated (by means of insulators 20 and 21) with the microphone holder at the bottom.

4.3.3 In the view of the board, the subject-matter of claim 1 differs from the disclosure of the aforementioned embodiment of D1 in that the microphone holder is made from a non-conducting rubbery material (in the

embodiment of D1, figure 9, the holder is made of a conducting rubbery material).

- 4.3.4 In the passage of D1 on page 7, lines 28-33 which immediately follows the aforementioned passage and is contained within the same paragraph, the following is however stated:

"As an alternative (not shown herein) the gasket 16 can be formed as a cylinder of non-conducting elastomeric material, which receives the microphone therein, said microphone then being connected to a PCB by means of an electrically conductive elastomeric connector."

The examining division relied on this passage to reason their objection of lack of novelty in the impugned decision.

- 4.3.5 However in the board's view, this passage does not explicitly disclose that the cylinder of non-conducting elastomeric material forming the gasket should have exactly the same form as in the figure 9 embodiment of D1, nor does it indicate the form of the connector to be combined with the cylindrical gasket, or indicate their mutual positional relationship.

The board therefore agrees with the appellant that the subject-matter of claim 1 is novel with respect to D1, Articles 52(1) and 54 EPC.

- 4.3.6 The objective problem to be solved, starting from prior art document D1, is regarded by the board as how to implement the arrangement comprising a cylindrical gasket of non-conducting elastomeric material and an

electrically conductive elastomeric connector as proposed in D1, page 7, lines 29-33.

- 4.3.7 In order to solve this problem, in the board's view, the skilled person would read the passage on page 7, lines 29-33 directly in combination with lines 16-29, since these passages are both part of the same paragraph. The statement "As an alternative ... " should be read in the sense of "an alternative to the embodiment of figure 9" rather than some general further embodiment unrelated to it.

As a consequence, the board considers that the skilled person aiming to implement the proposed alternative would retain all the features of the arrangement of figure 9 unless compelled to make changes as a result of the gasket 16 being now non-conducting.

In particular, the board considers that the skilled person would retain the shape of the gasket 16 shown in figure 9 as it is advantageously shaped to hold the microphone in place.

The skilled person is then faced with the problem of combining this non-conducting gasket with a suitable connector, which cannot be the connector 13 used in D1 since this provides only a single current path between microphone and circuit board. The skilled person would therefore consider the connectors of D1 providing two current paths, such as those of figures 1, 2 and 10. Since the parts 13, 20 and 21 in figure 9 together form a cylinder, the board regards it as obvious that the skilled person would select a connector having the same cylindrical form, insofar as such a connector is

readily available. This is here the case, as exemplified by the connector shown in figure 10 of D1, or the connector of figure 1 modified to be circular, as proposed in page 5, line 1. It is further regarded as obvious that the connector should be advantageously dimensioned to fit snugly into the hole formed in the gasket, copying the principle used for components 13, 20 and 21 of figure 9, thereby forming an integrated holder-connector falling within the scope of claim 1.

Hence, the board concludes that the skilled person, starting from D1 and endeavouring to solve the objective problem, would arrive at the subject-matter of claim 1 in logical and straightforward manner without the need for an inventive step.

4.3.8 In the appellant's last submission, the appellant commented as follows:

"We submit however that the embodiment in figure 9 is concerned with [a] metal-impregnated conductive elastomer, such that making an intergral (*sic*) holder would be relatively straightforward. This would not be the case where [the] gasket was non-conducting. Therefore when the passage at page 7 lines 28-33 mentions that the gasket may be "a cylinder of non-conductive elastomeric material, which receives the microphone therein, said microphone *then being connected to a PCB by means of an electrically conductive elastomeric connector*" the skilled man would take the passage to imply that the embodiments of figures 3, 5 and 7 which show non-conductive gaskets could be used with elastomeric connectors 10 formed from metal-impregnated conductive elastomer (*sic*) as

disclosed in the description relating to figure 9, rather than elastomers formed using wires previously described."

However, in respect of these comments, the board sees no reason why the making of an integral holder from a non-conductive elastomer should be less straightforward than from a metal-impregnated conductive elastomer. Furthermore, as indicated above, the board takes the view that the passage on page 7, lines 28-33 of D1 should be read in combination with the whole embodiment of figure 9, and considers it implausible that this passage might instead suggest that a gasket taken in isolation from one of figures 3, 5 or 7 should be combined with a single feature extracted from figure 9, as apparently argued by the appellant. Moreover, the term "electrically conductive elastomeric connector" used on page 7, line 33, does not imply a metal-impregnated elastomer, but is used in D1 equally for connectors formed using wires (cf. page 4, lines 26-30). Hence, the board is not convinced by these arguments.

4.3.9 In view of the above, the board concludes that the subject-matter of claim 1 according to the main request does not involve an inventive step, Articles 52(1) and 56 EPC.

4.4 *The first auxiliary request*

Claim 1 according to the first auxiliary request differs from the main request essentially in that: (a) the microphone holder is defined to be "in the form of a cup", and (b) the term "non-conducting rubbery

material" is defined instead as "a rubbery material having a relatively low electrolyte content".

With regard to difference (a): In using figures 2A-2C and 4 to interpret the term "in the form of a cup", it is clear that such a form may include a flange around the lip of the "cup", Therefore, the board considers that the arrangement of figure 9 of D1 must also be considered as being "in the form of cup". Hence this feature has no significance for inventive step.

With regard to difference (b): The expression "having a relatively low electrolyte content" is regarded by the board as merely an alternative expression for the term "non-conducting". This different formulation therefore has no relevance for inventive step, nor has the appellant argued otherwise.

Therefore, the board concludes that the subject-matter of claim 1 according to the first auxiliary request does not involve an inventive step either, Articles 52(1) and 56 EPC.

4.5 *The second, third and fourth auxiliary requests*

4.5.1 Claim 1 of each of these requests is identical and differs from claim 1 of the main request in that: (a) the connector body is made from a rubbery material, (b) the connector has metal wires embedded in a parallel alignment running in a direction approximately perpendicular to the bottom of the cup-formed microphone holder, (c) each wire has a diameter in the range from 5 to 100 μm , (d) the rubbery material of the microphone holder is a silicone rubber, (e) the

silicone rubber used for the microphone holder has a rubber hardness in the range from 20 to 80 DEG H in the JIS scale, and (f) the silicone rubber has a permanent compression set not exceeding 20%.

4.5.2 As noted above, it would be obvious for the skilled person to use a connector such as that shown in figure 1 of D1 in the context of the figure 9 embodiment. Such a connector would already exhibit features (a), (b) and (d) referred to above (cf. D1, page 4, line 26 - page 5, line 1 and page 5, line 19).

4.5.3 Features (c), (e) and (f) concern choices of parameter values. None of these parameter value choices in the view of the board contribute to an inventive step for the following reasons:

The definition of the diameter of the wires as given in feature (c) includes the range of diameter values disclosed in the appellant's own patent publication D3, which relates to similar types of connector to those disclosed in D1 (cf. D3, col. 3, lines 19-22). The skilled person seeking to implement the connector arrangement known from figure 1 of D1 in the context of the figure 9 embodiment would find it obvious to use similarly dimensioned wires.

With respect to feature (e): The appellant has not disputed that the JIS rubber hardness scale belongs to the common general knowledge of the skilled person. The board moreover notes that the definition of rubber hardness according to feature (e) covers most of the range of the JIS hardness scale, including "soft" and "hard" values of hardness; this point has not been

challenged by the appellant either. As the claimed range is so broad, the skilled person can be expected to select a rubber for the holder (i.e. the gasket) within this claimed range, as is for example the case for the connectors of D3 (cf. D3, col. 3, lines 37-38).

Finally, the specification of the holder compression as defined in feature (f) is in the board's view obvious having regard to D1, page 6, lines 10-15, which states that the connector should be subject to a compression in the range 7-12%, i.e. within the range of "not exceeding 20%" as claimed. The board sees no reason why the holder part would have a compression value above that of the connector part.

- 4.5.4 In the statement of grounds, the appellant has argued that "By making the cup-shaped microphone holder out of rubber having a rubber stiffness of 20 to 80 DEG H in the JIS scale and a permanent compression set not exceeding 20%, the reliability of the connection is improved. The prior art contains no instructions or suggestions that the microphone holder itself (rather than the connector between the microphone and the circuit board) should have this rubber stiffness, and the skilled man would not have realised that the rubber stiffness of the lateral walls of a microphone holder contributed to the reliability of the connection".

However, the board finds this argument unconvincing since the claimed range of hardness values of the holder extends well into the "soft" region of the JIS hardness scale, where the stiffness would be low (indeed lower than the hardness value recommended for

the connectors of D3). The claim therefore embraces embodiments which plausibly would not provide such an effect.

- 4.5.5 Hence in the board's view, the additional features comprised in claim 1 of the second, third, and fourth auxiliary requests with respect to claim 1 of the main request do not contribute to an inventive step.

The board therefore concludes that the subject-matter of claim 1 according to the second, third and fourth auxiliary requests does not involve an inventive step either, Articles 52(1) and 56 EPC.

4.6 *Fifth auxiliary request*

Claim 1 according to the fifth auxiliary request differs from claim 1 according to the second auxiliary request essentially in that: (a) the microphone holder is defined to be "in the form of a cup", and (b) the term "non-conducting rubbery material" is defined as "a rubbery material having an electrolyte in a content as low as possible".

These features have been discussed in relation to the first auxiliary request and found to be of no relevance to inventive step, the expression "a rubbery material having an electrolyte in a content as low as possible" being merely an equivalent expression to "a rubbery material having a relatively low electrolyte content" used in claim 1 according to the first auxiliary request.

The board therefore concludes that the subject-matter of claim 1 according to the fifth auxiliary request does not involve an inventive step either, Articles 52(1) and 56 EPC.

5. In view of the above, neither the appellant's main request nor any of the auxiliary requests is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Magliano

A. S. Clelland