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Case Number: T 0650/07 - 3.4.01

Application Number: 04396021.0

Publication Number: 1465290

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Language of the proceedings: EN

Title of invention:
Method for producing antenna components

Applicant:
Pulse Finland Oy

Opponent:
-

Headword:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0650/07 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 24 July 2008

Appellant: Pulse Finland Oy
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 19 January 2007 refusing European application No. 04396021.0 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: B. Schachenmann
Members: H. Wolfrum
F. Neumann

Summary of Facts and Submissions

I. European patent application 04 396 021.0 (publication No. EP-A-1 465 290) was refused by a decision of the examining division dispatched on 19 January 2007, for the reason of lack of inventive step (Article 52(1) EPC 1973 and Article 56 EPC 1973) of the subject-matter of the request then on file.

The examining division had based its decision on prior art given by documents :

D1 : WO-A-99/67851; and
D3 : WO-A-96/10803.

II. The applicant lodged an appeal against the decision and paid the prescribed fee on 20 March 2007. On 2 April 2007 a statement of grounds of appeal was filed.

The appellant requested that the contested decision be set aside and a patent be granted on the basis of a set of claims 1 to 12 filed as a "main request" on 2 April 2007. No request for oral proceedings was made.

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

"*1. A method for producing antenna components intended for planar antennas, in which method a plurality of antenna components are processed on a tape-like plastic blank (101; 201; 301), and regarding each antenna component (400)*
- a radiator (RPN), feeding conductor (FC) and shorting conductor (SC) are formed in a unitary conducting layer by removing (501) material from it

- a protrusion (111; 112; 113) with a height being a designed height of a planar antenna is tooled (502) into said plastic blank in order to form a dielectric supporting part for the radiator, and
- it is provided with contacts to connect it electrically to a radio device,
***characterised** in that*
- in the beginning said blank tape has been wound on a first coil former (RL1), said plurality of antenna components are processed (501-507) in successive locations on the tape while it moves out from the first coil former, and the tape carrying processed antenna components is wound on a second coil former (RL2), and, regarding each antenna component
- the radiator and the feeding and shorting conductors joining the radiator are placed (503) on surface of said protrusion
- at least one gap is formed (504) in the plastic blank around said protrusion at least for an attachment of said contacts, and
- one (CT1) of said contacts is attached (505) to the feeding conductor (FC) and another (CT2) to the shorting conductor (SC)."

Claims 2 to 12 are dependent claims.

IV. The examining division having to decide on substantially identical subject-matter had considered the features by which the subject-matter of claim 1 differed from a method for producing antenna components intended for planar antennas as known from document D1 to constitute measures which were obvious for the skilled person in view of respective indications given in D1 itself or in document D3.

V. The appellant disagreed with the findings of the examining division in particular as regards the extent of the teaching provided by document D1. Apart from the fact that document D1 did not address the problem solved by the present application relating to cost-effective packaging of antenna components, the known method did not fulfil any of the conditions defined in the characterising part of claim 1 on file and, in addition to the differences identified by the examining division, neither did it "tool" the protrusions into the plastic blank nor did it provide the antenna components with contacts. Moreover, document D3 did not disclose manufacturing of a component including an antenna and thus its teaching could not be applied to that of document D1.

Reasons for the Decision

1. In the following reference is made to the provisions of the EPC 2000, which entered into force as of 13 December 2007, unless the former provisions of the EPC 1973 still apply to pending applications.

2. The appeal complies with the requirements of Articles 106 to 108 EPC 1973 and Rule 64 EPC 1973 and is, therefore, admissible.

3. *Inventive step*

3.1 As regards the teaching of document D1, the board shares in substance the assessment given by the examining division in the contested decision.

In fact, document D1 discloses a method for producing antenna components which *inter alia* include patch elements, ie antenna elements which possess a radiator and a corresponding feeding conductor on a dielectric support (claim 16; page 6, lines 31 to 33; page 9, lines 11 to 13). In the known method, a plurality of antenna components are processed on a plastic blank, which has for instance the form of a band (page 6, lines 5 to 7; Figure 13). For each antenna component, after forming the conductive antenna pattern on the plastic blank (page 11, lines 23 to 25), a protrusion with a height being a designed height of the antenna component is produced by thermoforming into said plastic blank in order to form a dielectric supporting part for the antenna pattern which includes a radiator and a feeding conductor (page 6, lines 16 to 21; page 10, line 27 to page 11, line 12; page 11, lines 27 to 28; Figure 13). Finally, the antenna component is provided with an electrical connection (connection 32 in Figure 11) which is attached to the feeding conductor (provided by matching means 31 and feed portions 25) and may extend through a hole in a recess or gap in the sidewall of the protrusion (hole 30) for attachment to a printed circuit board. Alternatively or additionally, the feeding conductor of the known antenna component may be attached to contacts in the form of conductive springs or clips, conductive pads or pogo-pins (page 7, lines 2 to 5).

3.2 It follows that the subject-matter of claim 1 under consideration differs from the known method in the following aspects :

i) the conductive antenna patterns on the surface of the protrusion comprise a shorting conductor in addition to the radiator and feeding conductor and a corresponding contact to the shorting conductor;
ii) the radiator, feeding conductor and shorting conductor are formed in a unitary conducting layer by removing material from it;
iii) the blank band has the form of a tape which, in the beginning, has been wound on a first coil former, the antenna components are processed in successive locations on the tape while it moves out from the first coil former, and the tape carrying the processed antenna components is wound on a second coil former.

3.3 In this context, no differences can be seen between the subject-matter of claim 1 under consideration and the teaching of document D1 in the features that the protrusion is "tooled" into the plastic blank and that the antenna components are provided with contacts, which are put into a gap made in the plastic blank tape and attached to feeding conductors, as is alleged by the appellant.

The board considers protrusions being produced by vacuum thermoforming as described in document D1 to constitute "tooled protrusions" in the usually recognized meaning of the term "tooled". Claim 1 under consideration does not mention any specific measure which would require to give the expression "tooled into said plastic blank" a meaning that would not encompass vacuum thermoforming, nor has the appellant put forward any explanation in support of its allegation.

As regards the matter of contacts, the appellant has argued that connection 32 shown in Figure 11 of document D1 had the form of a strip and thus was not a contact since in electric circuits the term "contact" meant unambiguously a conductive object which could be pressed against another conductor and loosened from it. Moreover, strip 32 was not even attached to feed portion 25 but to matching means 31 and document D1 did not show in detail how strip 32 was possibly led through hole 30 and extended into a contact surface on the opposite surface of the band. As far as document D1 mentioned contacts for connection to a printed circuit board, these were probably attached to the PCB.

The board disagrees with the narrow interpretation of the term "contact" as relied on by the appellant. First of all, any electrically conductive part which serves for the necessary electrical connection from outside (eg from a circuit board) to the feeding conductor and radiator on the surface of the protrusion of the antenna component acts as and thus constitutes a "contact" in the generally recognised meaning of the term. There can be no doubt that the known antenna component must have such a contact. Furthermore, the appellant even admits that connection 32 shown in Figure 11 of document D1 would have to extend into a metallised via formed in hole 30 and a contact surface at the opposite side of the band for electrical connection to the printed circuit board. In this respect it is irrelevant that the Figures of document D1 do not show the contact structure. From Figure 11 and the corresponding passage of the description it can be seen that a contact is provided on the underside of the structure beneath the hole 30 (page 9, lines 13

to 15). A gap in the form of a recess is provided in the wall of the protrusion to allow the routing of the connection 32 between the feeding conductor 25 and the hole 30 (and ultimately the contact located on the underside of the hole). Figure 11 therefore shows that a gap is formed in the plastic blank around the protrusion to allow attachment (ie connection) of the contact.

Only for the sake of completeness it is added that even if claim 1 under consideration were to specify the provision of a kind of spring or press contact on the antenna element, document D1 also would hint at such a structure for connecting the feeding conductor to a printed circuit board (D1 : page 6, line 33 to page 7, line 5). That the specific contacts mentioned in this citation should be attached to the printed circuit board instead of the antenna element is mere speculation on the side of the appellant and not supported by any evidence from document D1.

3.4 On the basis of the differences established in point 3.2 above, the objective problem can be seen in the desire for a cost-effective method for manufacturing and packing for transport a plurality of antenna components of a planar type including a shorting conductor.

In the board's view, this problem concerns common incentives in mass production of electronic components applied to the manufacturing of an as such known type of antenna component and thus does not contribute to the presence of an inventive step.

3.5 Nor does the claimed solution require the exercise of inventive skill.

Clearly the manufacturing method known from document D1 is suited for any kind of antenna elements comprising conductive patterns formed on a dielectric support, as is repeatedly confirmed in D1 (claim 16; page 6, lines 31 to 33; page 8, lines 7 to 9, 16 to 18, and 28 to 29; page 9, lines 11 to 13). In this context, D1 expressly refers to patch elements, *ie* planar antennas, some common types of which, such as PIFA (planar inverted F antenna) elements, have conductive patterns comprising a radiator, feeding conductor and shorting conductor. Thus, in the case of such a patch element, the radiator and the feeding and shorting conductors would be placed, in accordance with aforementioned feature i), on a surface of the protrusion, in analogy to what is illustrated by Figures 10 and 11 for other kinds of conductive antenna patterns.

Moreover, aforementioned feature ii) constitutes an obvious measure to be taken since removing material from a unitary conducting layer concerns a commonly employed fabrication technique for the formation of conductive antenna patterns on a dielectric support.

As regards the features summarized above under iii), document D1 expressly foresees a processing of individual supporting parts of plastic blank for each antenna component, which parts are cut off from a blank band before forming on them the protrusion and the conductive patterns. D1 also foresees the simultaneous shaping of a number of carriers in the band (page 11, lines 8 to 11). In addition, the skilled person knows

from document D3 about the alternative of forming a plurality of electronic components including antenna components on successive locations of a dielectric tape which is unwound from a coil former and about the associated advantages in terms of minimizing the effort of handling and ease of transport when the tape with the components formed thereon is rewound on another coil former (D3 : page 1, lines 21 to 24; page 1, line 35 to page 2, line 11; page 2, line 34 to page 3, line 9). Considering the technical fields to which documents D1 and D3 belong to be the same or at least closely related, the board agrees with the findings of the examining division that no exercise of inventive skill would have been required to contemplate replacing the approach of forming antenna components in an individualised manner, which is shown in the embodiments of document D1, by a combined handling of plural antenna components during production and subsequent transport, as known from document D3, in order to benefit from the known advantages and thus to implement features iii) in the method for producing antenna components known from document D1.

3.6 The appellant has considered the contentions of the examining division regarding document D3 as being fully erroneous and the idea of this document as not being applicable to the teaching of document D1. Document D3 did not disclose manufacturing of a component including an antenna but referred to a method where pre-formed components were put on a support foil with an adhesive top layer when the foil was wound from one spool to another. The proper teaching of D3 was to add a protective foil from a third spool on the components after they had been put on the support foil. From the

fact that the designers of the system of document D1, although they had surely known that a tape could be wound from one spool to another, had not mentioned the possibility to apply such a technique to their process it could be supposed that the components according to D1 lent themselves worse for spooling. For these reasons, the contention that winding the tape which carries the processed antenna components on a second coil former was an obvious alternative in the D1 method was not credible.

The board does not consider these arguments convincing. To start with, the board disagrees with the assertion that the teaching of document D3 predominantly concerned the provision of a protective foil from a third spool. In fact, this aspect is mentioned in D3 as an advantageous embodiment. However, the basic teaching of document D3 is that of producing a plurality of electronic components which, after their provision on successive locations of a tape wound from a first coil former, are rewound on a second coil former so as to be readily transported to another location for further use of the components. In this context, details of the structure of the conductive patterns which make up the electronic components and of the manufacturing process which concern the manner by which the components are formed on the tape are evidently immaterial for the advantages achieved by processing an intact tape in terms of ease of handling and transport. For this reason, it would have been obvious for the skilled person that the basic concept taught by document D3 is applicable to the method of producing antenna components on a protruding surface of a dielectric support as known from document D1. The circumstance

that the authors of document D1 did not mention the possibility of winding the antenna components having a structure as shown for instance by Figure 11 of D1 onto a second coil former for subsequent transport of the antenna components is an argument which supports novelty of the respective features but is irrelevant in the context of considerations concerning inventive step and can by no means prove that the antenna components of document D1 would not be amenable to the manufacturing concept taught by document D3.

3.7 For the above reasons, claim 1 of the appellant's request on file does not involve an inventive step within the meaning of Article 56 EPC 1973.

Consequently, the request is not allowable.

4. The appellant's request pursued in the appeal is in substance identical to that on which the contested decision of the examining division was based. As far as claim 1 is concerned, apart from adding some reference signs, the former wording "*at least one opening is formed (504) in the plastic blank around said protrusion for an attachment of said contacts*" has been replaced by the wording "*at least one gap is formed (504) in the plastic blank around said protrusion at least for an attachment of said contacts*", so as to bring the claim definition in better conformity with the application description. Thus the reasons for refusal relied on by the examining division apply with equal force to the appellant's present request.

The fact that a board of appeal may agree with the judgement of an examining division cannot come as a

surprise to an appellant. Therefore, as neither the facts of the case nor the request have changed, the board does not consider it compulsory for safeguarding the appellant's right to be heard (Article 113(1) EPC 1973) to inform him in advance of a possible outcome of the case, *eg* by means of a communication. Rather, an immediate decision in the present case is to be taken, given the fact that oral proceedings were neither requested nor considered expedient.

Order

For these reasons it is decided that :

The appeal is dismissed.

The Registrar The Chairman

R. Schumacher B. Schachenmann