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Datasheet for the decision of 30 August 2006

Case Number: T 0091/05 - 3.4.01

Application Number: 01107928.2

Publication Number: 1139487

IPC: H01P 5/18

Language of the proceedings: EN

Title of invention:
Housing of a directional coupler

Applicant:
HIROSE ELECTRIC CO., LTD.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
"Inventive step - no (main request)"
"Added subject-matter - yes (auxiliary request)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0091/05 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 30 August 2006

Appellant: HIROSE ELECTRIC CO., LTD.
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Shinagawa-ku
Tokyo (JP)

Representative: Pätzold, Herbert
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 29 July 2004 refusing European application No. 01107928.2 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: B. Schachenmann
Members: R. Bekkering
H. Wolfrum

Summary of Facts and Submissions

I. European patent application 01 107 928.2 (publication no. EP-A-1 139 487) was refused pursuant to Article 97(1) EPC by a decision of the examining division dispatched on 29 July 2004, on the ground of lack of inventive step (Articles 52(1) and 56 EPC).

II. The applicant (appellant) lodged an appeal against the decision on 3 October 2004 and paid the appeal fee on the same day. The statement setting out the grounds of appeal was received on 8 December 2004.

III. Oral proceedings, requested as an auxiliary measure by the appellant, were held on 30 August 2006.

IV. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Main request:

Claims:	no. 1 to 4 filed with letter of 21 June 2004;
Description:	pages 1 to 5 as originally filed;
Drawings:	sheets 1/4 to 4/4 as originally filed.

Auxiliary request:

Claims:	no. 1 to 2 filed with letter of 31 July 2006;

Description and drawings as for the main request.

V. Claim 1 according to the main request reads as follows (itemisation added by the board):

(a) A directional coupler (21) comprising:
(b) a conductive case (34) made in a form of a box;
(c) a plurality of dielectric boards (22, 23, 24) provided in said conductive case (34);
(d) a main line (27) having a pair of main tabs (28) and
(e) an auxiliary line (30) having a pair of auxiliary tabs (31);
(f) a ground plate (25) provided on an outer face of one of said dielectric boards (22, 23, 24) characterized in that
(g) said conductive case (34) has notches (36) provided on said side walls (35);
(h) said main and auxiliary lines (27; 30) are provided on an intermediate dielectric board (22) which is sandwiched between a first and second dielectric board (23, 24); and
(i) said conductive case (34) covers the outer face of one of said first and second dielectric boards (23, 24) and the sides of said intermediate dielectric board (22) and said first and second dielectric boards (22, 24) and
(j) said ground plate (25) covers an outer face of the other of said first and second dielectric boards (22, 24); and
(k) said main and auxiliary tabs (28; 31) are provided at positions corresponding to notches (36) of said conductive case (34); and
(l) said main and auxiliary tabs (28; 31) of said main and auxiliary lines (27; 30) are provided on different faces (26, 29) of said intermediate board;

(m) whereby said main and auxiliary tabs (28; 31) extend from said intermediate dielectric board (22) and said notches (36); and
(n) said ground plate (25) has side walls making contact with said side walls (35) of said conductive case (34).

VI. Claim 1 according to the auxiliary request reads as follows:

"*Method of producing a directional coupler (21) comprising:*
a conductive case (34) made in a form of a box;
a plurality of dielectric boards (22, 23, 24) provided in said conductive case (34);
a main line (27) having a pair of main tabs (28) and an auxiliary line (30) having a pair of auxiliary tabs (31);
a ground plate (25) provided on an outer face of one of said dielectric boards (22, 23, 24);
said conductive case (34) has notches (36) provided on said side walls (35);
said main and auxiliary lines (27; 30) are provided on an intermediate dielectric board (22) which is sandwiched between a first and second dielectric board (23, 24); and
said conductive case (34) covers the outer face of one of said first and second dielectric boards (23, 24) and the sides of said intermediate dielectric board (22) and said first and second dielectric boards (22, 24) and
said ground plate (25) covers an outer face of the other of said first and second dielectric boards (22, 24); and

said main and auxiliary tabs (28; 31) are provided at positions corresponding to notches (36) of said conductive case (34); and
said main and auxiliary tabs (28; 31) of said main and auxiliary lines (27; 30) are provided on different faces (26, 29) of said intermediate board; whereby said main and auxiliary tabs (28; 31) extend from said intermediate dielectric board (22) and said notches (36); and
said ground plate (25) has side walls making contact with said side walls (35) of said conductive case (34); whereby
said conductive case (34) is put over the said second dielectric board (23), said intermediate board (22), said first dielectric board (23) and said ground plate (25) to align all at once by its side walls (35), and whereby
at least one of said side walls (35) of said conductive case (34) is deformed so to [sic] engage said ground plate (25)."

VII. Reference is made to the following documents:

D5: US-A-4 823 097

D6: US-A-4 394 630

D8: DE-U-94 09 625

D10: DE-A-2 041 484

Reasons for the Decision

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

2. *Main request*

2.1 Novelty, inventive step

2.1.1 Having regard to the subject-matter of claim 1 of the main request, the closest prior art is provided by document D5 (see figures 7A, 7B and corresponding description).

In particular, document D5 discloses a directional coupler in accordance with feature (a) of claim 1 with a housing consisting of two parts (81a, 81b) made of metal (see column 3, lines 1 to 7). As in substance held in the decision under appeal, the upper part of the housing (81a) may be designated as a conductive case in the form of a box in accordance with feature (b) of the pre-characterising part of claim 1. The lower part (81b) may be designated as a ground plate covering the outer face of the lower dielectric board (78) in accordance with features (f) and (j) of claim 1.

2.1.2 However, in this case only the upper dielectric board (79) can be said to be provided in the upper part of the housing. Furthermore, the upper part (81a) only covers the sides of the upper dielectric layer and in part the sides of the dielectric spacer board (80), but not the sides of the lower dielectric board. Accordingly, features (c) and (i) are not entirely

provided by document D5. Moreover, arguably, the ground plate as constituted by the lower part (81b) would not have side walls making contact with said walls of the upper part (81a) as per feature (n) of claim 1 under consideration.

2.1.3 The directional coupler disclosed in document D5, furthermore, comprises coupling lines (73, 74) with terminal lines or tabs at their ends (71a, 71b, 72a, 72b) in accordance with features (d) and (e) of claim 1. Moreover, notches in the housing in correspondence with the tabs (71a, 71b, 72a, 72b) are indispensable in order to contact the tabs and, thus, inevitably present in the coupler of document D5 (see feature (g) of claim 1).

2.1.4 Finally, in document D5 the coupling lines are provided, at least prior to the final assembly, on the upper and lower dielectric board (79, 78), respectively, rather than on the intermediate dielectric board. Moreover, the tabs do not extend from the intermediate dielectric board and the notches in the housing. Accordingly, features (h), (k), (l) and (m) of claim 1 are not disclosed in document D5.

2.1.5 In conclusion, document D5 discloses a directional coupler in accordance with features (a), (b), (d) to (g) and (j). Not provided in document D5 are features (c), (h), (i), (k), (l), (m) and (n) of claim 1.

Accordingly, novelty of the subject-matter of claim 1 over document D5 is provided.

2.1.6 In view of the above differences over document D5, the objective problem to be solved may be seen in providing a coupler construction which allows for simple and cost effective manufacturing.

As far as the above features (c), (i) and (k) are concerned, however, the claimed housing is considered to be a straight-forward alternative to the housing of document D5, readily available to the skilled person and which, as such, is widely used. Reference is made in this respect to document D10 in which a coupler with a (here insulating) housing consisting of a recessed part laterally enclosing all boards and a plate (see figure 1 and corresponding description), with notches provided in the housing, is disclosed.

As far as the provision of extending tabs (feature (m)) is concerned, as in substance held in the decision under appeal, this would be an obvious design measure for the skilled person in order to facilitate the electrical contacting of the lines. As such the provision of tabs to this end, besides being generally obvious, is already suggested in the specific context of directional couplers in document D8 (see figure 1) as well as document D10 (see figure 1).
As regards feature (h) and (l), the provision of the coupling lines on the two sides of an intermediate board, rather than on the upper and lower board, as is the case in document D5, also merely constitutes an obvious design alternative, which moreover is already suggested for directional couplers in document D6 (see figure 7).

Finally, as regards feature (n), providing a contact between side walls of the lower plate of the case and the side walls of the upper part of the case, rather than between the upper face of the lower plate of the case and the front face of the side walls of the upper part of the case, as would follow from a combination of the teachings of documents D5 and D10, merely represents a straightforward alternative arrangement, readily available to the skilled person who is considered to be familiar with electronic housings in the form of boxes.

As such, the above distinguishing features merely provide an aggregation of simple and straightforward design alternatives with respect to document D5.

2.1.7 The appellant argued that in particular feature (n) provided for a simple and cost effective assembly of the coupler. Whereas the solutions adopted in both document D5 and D10 required strict tolerances for the manufacturing of the upper and lower parts of the cases in order to adequately hold the enclosed dielectric boards together, no such requirements were placed on the claimed arrangement. Since the ground plate lay within the side walls of the case and was only attached to the case after the dielectric boards, the case and the ground plate were joined by "grommets", the case dimensions were uncritical.

In the board's opinion, however, the skilled person in the technical field at issue would be familiar with these different types of per se well-known cases and their respective advantages, and would select an

appropriate type depending on the circumstances as a matter of routine design practice.

The appellant, moreover, argued that the attachment of the case to the ground plate provided the additional advantage of reinforcing the fastening by means of the "grommets".

The application as filed, however, is silent about any such advantage or function of case and ground plate. Furthermore, it is noted that claim 1 does not require any firm attachment of the case to the ground plate which would allow such a reinforcement, neither does it by the way define any "grommets" (depicted in figure 4 as rivet-like elements) for fastening the dielectric boards, case and ground plate. At any rate, the skilled person would be aware of the fact that the case and ground plate enclosing the dielectric boards may contribute to reinforcing the mounting of the latter and take this into account when selecting an appropriate case type.

2.1.8 For the above reasons, the subject-matter of claim 1 according to the main request lacks an inventive step (Articles 52(1) and 56 EPC).

The main request is, therefore, not allowable.

3. *Auxiliary request*

3.1 Amendments

Claim 1 of the auxiliary request has been amended so as to include the feature that: "*said conductive case (34)*

is put over the said second dielectric board (23), said intermediate board (22), said first dielectric board (23) and said ground plate (25) to align all at once by its side walls (35)".

In the application documents as originally filed, however, there is no basis for this feature. As disclosed in the description (see page 4, line 24 to page 5, line 12) and shown in figure 4, the "*intermediate dielectric board 22 is held between the first and second dielectric boards 23 and 24, and the ground plate 25 is put on the outer face of the first dielectric board 23. Then, the conductive case 34 is put over the second dielectric board 24, the intermediate board 22, and the first dielectric board 23, and grommets 37 are put through the ground plate 25, the first, intermediate, and second dielectric boards 23, 22 and 24, and the conductive case 34, and their ends are deformed to join them together.* [...] *After the conductive case 34 is put over the dielectric boards 22, 23 and 24, their* [sic] *side walls 35 may be punched or screwed onto or deformed around the sides of the ground plate 25 so as to provide firmer and closer attachment of the conductive case 34 to the ground plate 25, thereby enhancing the ground and shield characteristics.*"

In particular, there is no indication in the application as filed that the dielectric boards should tightly fit within the case so as to be aligned by the latter. Alignment would rather appear to be provided by the bores in the dielectric boards, ground plate and case through which the "grommets" are inserted.

Accordingly, claim 1 of the auxiliary request contains subject-matter extending beyond the content of the application as originally filed, contrary to the requirements of Article 123(2) EPC.

The auxiliary request is, therefore, not allowable either.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

R. Schumacher B. Schachenmann