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Anmeldenummer / Filing No / N^o de la demande : 83 106 163.5

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Bezeichnung der Erfindung: Metal oxide varistor

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : H01C 7/10

ENTSCHEIDUNG / DECISION

vom / of / du 15 November 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /

Titulaire du brevet :

Kabushiki Kaisha Toshiba

Einsprechender / Opponent / Opposant :

Asea Brown Boveri AG

Stichwort / Headword / Référence :

EPO / EPC / CBE Art. 56 EPC

Schlagwort / Keyword / Mot clé : "Inventive step (no)"

Leitsatz / Headnote / Sommaire

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Patentamt
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European Patent
Office
Boards of Appeal

Office européen
des brevets
Chambres de recours



Case Number : T 593/88 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 15 November 1990

Appellant :
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Decision under appeal : Decision of Opposition Division of the European
 Patent Office dated 29 September 1988 rejecting
 the opposition filed against European patent
 No. 0 097 923 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : K. Lederer
Members : H. Reich
 L. Mancini

Summary of Facts and Submissions

- I. European patent No. 0 097 923 was granted on the basis of European patent application No. 83 106 163.5.
- II. The opposition filed by the Appellant against the granted patent for lack of inventive step was rejected by the Opposition Division.
- III. The Appellant lodged an appeal against the Opposition Division's decision.

In his statement of the grounds of appeal, the Appellant submitted that the subject-matter of the valid claims lacked an inventive step in view of documents which had already been cited in the procedure before the Opposition Division, but in subsequent submissions he also contested the novelty of the valid independent claim over the disclosure of newly cited document JP-A-56 101 711 (D4), of which he filed a certified English translation (D4').

- IV. Three weeks before oral proceedings were held, the Respondent (Patentee) filed an amended Claim 1 comprising a preamble taking into account the disclosure of document D4 and a characterising portion specifying that the process for preparing fine particle powder from a co-precipitate in accordance with the preamble involves refrigerating dehydration of the co-precipitate. This feature had not been set out in any of the previous versions of the claims.

This amended Claim 1, as filed on 23 April 1990, reads as follows:

"1. A metal oxide varistor comprising a component of grain bodies composed of zinc oxide and a component of grain

boundary layers comprised of at least one metallic oxide containing a metal other than zinc, wherein at least a portion of at least any two of the metal oxides selected from amongst the at least one metallic oxide and the zinc oxide are derived from a fine particle powder prepared by a co-precipitation method which comprises the steps of:

(a) preparing an aqueous solution comprising two or more metal ions, and

(b) adding a base to the aqueous solution to form a co-precipitate comprising substantially all of said metal ions in the form of corresponding metallic oxides;

characterised in that the fine particle powder is prepared from the co-precipitate by a process including at least the step of subjecting the co-precipitate to refrigerating dehydration."

Claims 2 to 5 are dependent on Claim 1.

V. At the end of the oral proceedings during which the Appellant inter alia complained of not having had sufficient time for carrying out a comprehensive additional search directed to the newly introduced feature, the Board after deliberation decided that the procedure would be continued in writing and invited the Appellant to present further submissions with respect to the new characterising feature of the amended Claim 1 and the Respondent to comment on any such submission made by the Appellant.

VI. In reply to the Board's invitation, the Appellant (Opponent) filed the following document:

Chemie Ingenieur Technik, December 1973, 45. Jahrgang, pages 1330 to 1336 (D5),
contending that Claim 1 would be obvious in view of document D4 and D5.

The Appellant requests that the decision under appeal be set aside and the patent revoked (main request). As an auxiliary request, he requests that valid Claim 1 be subjected to a search under Article 92 EPC.

VII. The Respondent (Patentee), after receipt of the Appellant's submission according to point VI above, continues to request that a patent be granted on the basis of Claim 1 as filed on 23 April 1990 and Claims 2 to 5 as granted.

VIII. In support of his request, the Appellant essentially submitted that a metal oxide varistor as defined in the preamble of Claim 1 was known from document D4. Document D4 indeed failed to specify which process should be used in the applied dehydrating step of the co-precipitate in order to prepare a fine particle powder. Refrigerating dehydration would however be known from document D5 in particular page 1336, last paragraph, to be a suitable process for drying ceramic materials in view of their subsequent sintering. Thus, it would be obvious to a skilled person, that the dehydrating step of document D4 may also be refrigerating dehydration. The varistor claimed in Claim 1 therefore lacked an inventive step in view of documents D4 and D5.

IX. The Respondent, for his part, contended that the application of freeze-drying in the preparation of sintered ceramic materials was mentioned in D5 as only one of several equally stressed alternatives. Moreover, document D5 merely described the principles of the freeze-drying technique and neither suggested to apply it to the method mentioned in D4 for manufacturing metal oxide varistors nor in any way taught the physical and chemical properties of the freeze-dried material after sintering.

In this respect, the results of comparative tests filed on 23 April 1990 revealed that metal oxide varistors produced by a method as described generally in document D4 but involving refrigerating dehydration exhibited increased uniformity of the distribution and particle size of their components as compared to those of metal oxide varistors obtained in a process in which drying was carried out in a conventional drier, at 150°C.

Reasons for the Decision

1. The appeal is admissible.
2. Procedural matters

Documents D4 and D5 have not been submitted by the Appellant until long after expiry of the opposition period. These documents however are considered to be of such relevance that they have to be taken into account by the Board using the powers conferred on it by Article 114(1) EPC.

The appeal procedure was continued in writing following the oral proceedings of 17 May 1990. In compliance with the requirements of Article 113(1) EPC, the Respondent was given adequate opportunity to present his comments on the Appellant's arguments based on documents D4 and D5; see points VII and IX above.

3. The present patent documents meet the formal requirements of the EPC.

In particular, the granted version of Claim 1 has been amended only by introducing the additional feature that the preparation of the fine particle powder involves at least the step of subjecting the co-precipitate to refrigerating dehydration, which feature was adequately disclosed in the patent documents as originally filed (page 5, lines 18 and 19; page 8, lines 1 and 2) as required under Article 123(2) EPC. This additional feature limits moreover the scope of the granted claim in compliance with Article 123(3) EPC.

There is no objection either to the introduction of the expression "freeze-drying" in the patent description (page 4, lines 15 and 57) instead of the original and somewhat unusual expression "refrigerating dehydration"; both expressions are intended to designate the same process in which water is removed by conversion into ice, followed by sublimation.

4. Novelty

- 4.1 Document D4 discloses a metal oxide varistor comprising a component of grain bodies composed of zinc oxide and a component of grain boundary layers (D4', page 13, lines 5 and 6: grain boundaries of zinc oxide are filled with additives) comprised of at least one metallic oxide containing a metal other than zinc (D4', page 7, example 1: bismuth oxide, cobalt oxide, manganese oxide, antimony oxide and chromium oxide), wherein at least a portion of at least any two of the metal oxides selected from amongst the at least one metallic oxide and the zinc oxide are derived from a fine particle powder prepared by a co-precipitation method which comprises the steps of preparing an aqueous solution comprising two or more metallic ions, adding a base to the aqueous solution to form a co-precipitate comprising substantially all said

metal ions in the form of corresponding metallic oxides and subjecting the co-precipitate to a drying process (D4', Claims 1 and 2).

Document D4 does not disclose any detail of the drying procedure to be performed.

Thus, the subject-matter of Claim 1 is distinguished from the content of document D4 in that the drying procedure is specified to consist of "refrigerating dehydration".

4.2 Document D5 refers in particular to freeze-drying which it states to be of importance for the manufacturing of ultra-fine products exhibiting uniform grain size. Document D5 further specifies that the process is expected to be of interest for instance in the manufacturing of sintered ceramic products (page 1336, last paragraph, second and third sentences). However, document D5 does not disclose the use of freeze-drying as a dehydration procedure in the manufacturing of a metal oxide varistor produced by the co-precipitation method set out in Claim 1.

4.3 The remaining prior art documents do not come closer to the claimed subject-matter.

4.4 For these reasons, the subject-matter of Claim 1 is novel in the sense of Article 54 EPC.

5. Inventive step

5.1 Document D4, which both parties agreed to consider as the nearest prior art, does not specify in which way the co-precipitate, formed from the aqueous solution by adding a base, is dried to form a fine particle powder.

Accordingly, the objective technical problem underlying the present invention as claimed in Claim 1 is to find an appropriate process for carrying out the known drying step in the known preparation of the fine particle powder.

- 5.2 Document D4 puts much emphasis on the advantageous effect of the co-precipitation method it describes, which "results from a highly dispersed state of the additives in the solution, and from a highly uniform dispersion of fine particles in the dried material" (D4'; page 13, lines 23 to 26). Accordingly, in order not to annihilate this advantageous result of the co-precipitation method, the skilled person would as a matter of fact take care to select a drying procedure which preserves both the uniform distribution and fine particle size in the co-precipitate.

Though document D5 discloses the freeze-drying technique as an alternative within a number of apparatus and processes for drying various materials, freeze-drying is explicitly said in document D5 to be of interest in the manufacturing of very fine products of uniform particle size. Moreover, document D5 even emphasises the suitability of a freeze-drying step in the production of ceramic basis materials for sintering (page 1336, last paragraph, second and third sentences).

Hence, the Board is convinced that the skilled person would easily recognise the suitability of the freeze-drying process disclosed in D5 for the manufacturing of ceramic varistors according to the process step known from document D4, and thus easily fill out the information gap in document D4 about the specific character of the known drying step and arrive, without any non-obvious ingenuity, at the claimed subject-matter.

- 5.3 The comparative test filed by the Respondent on 23 April 1990 merely confirms that the freeze-drying method results in increased uniformity of the composition and particle size distribution throughout the varistor as compared to a "heat-drying" method performed at 150°C. These results however are expected by the skilled person in view of the statements in document D5 referred to above, and for this reason cannot positively contribute to the assessment of an inventive step.
- 5.4 For these reasons, the subject-matter of Claim 1 does not involve an inventive step in the sense of Article 56 EPC.
6. The ground for opposition mentioned in Article 100a) EPC thus prejudicing the maintenance of the patent even in its amended form, the patent is to be revoked.
7. Since the Appellant's main request is allowed, his auxiliary request need not to be considered further.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

P. Martorana

K. Lederer