BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File No.: T 0826/92 - 3.5.2

Application No.: 87 116 319.2

Publication No.: 0 268 156

Classification: H01H 33/72

Title of invention: Insulated nozzle for use in an interrupter

D E C I S I O N
of 20 September 1993

Applicant: MITSUBISHI DENKI KABUSHIKI KAISHA

Proprietor of the patent:

Opponent:

Headword:

EPC: Art. 56

Keyword: "Inventive step (yes, after amendment)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0826/92 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 20 September 1993

Appellant: MITSUBISHI DENKI KABUSHIKI KAISHA
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 8 April 1992 refusing European application No. 87 116 319.2 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: R.E. Persson
Members: A.G. Hagenbucher
W.J.L Wheeler

Summary of Facts and Submissions

I. The present appeal contests the decision of the Examining Division refusing the Appellant's European patent application No. 87 116 319.2. The reason given for the refusal was that the subject-matter of Claim 1, then on file, did not involve an inventive step having regard to the following prior art documents:

D1: EP-A-66 298

D2: JP-A-58-178 931.

II After some correspondence between the Board and the Appellant, the Appellant filed on 13 July 1993 new description pages 1 to 6 and on 3 August 1993 Claims 1 and 2, an insert on description page 3 and a description page 7. He requested the grant of a patent on the basis of these documents.

Claim 1 is now worded as follows:

"An insulated nozzle for use in an interrupter, in which said nozzle is disposed between a pair of contacts where an arc occurs and is adapted to extinguish said arc by blowing an insulating gas onto said arc, the insulated nozzle consisting of a fluoroplastic and boron nitride mixed into said fluoroplastic at a weight percent in the range of 0.3 to 1.0."

Claim 2 is dependent on Claim 1.

III The Appellant argued essentially that according to D1 the use of 0.1 to 20 parts of weight of boron nitride for the nozzle of the interrupter was optional. D1 required only the combination of a polyolefin resin and

nitrogen containing polymers, the latter being excluded by the wording of Claim 1. D1 did not show that the use of a filler, such as boron nitride, rather than a special polymer containing nitrogen had any influence on the electrical and mechanical characteristics of the material in question. D2 taught the use of a fluoroplastic and of boron nitride as a filler for an insulated nozzle of an interrupter. Boron nitride was used there in a volumetric ratio of 1 to 30%, however. It could not be derived from these documents that the relationship between the proportion of mixed boron nitride and the overall performance being obtained from the withstand voltage performance and the interruption performance had a maximum with boron nitride less than 1.0 per cent as shown in figure 4 of the present application.

Reasons for the decision

1. The Appeal is admissible.

2. Claim 1 has been restricted to a nozzle consisting of a fluoroplastic and boron nitride mixed into that fluoroplastic in a certain weight percentage. Since the description as filed describes the relationship between the proportion of boron nitride mixed into the fluoroplastic, without mentioning any other constituents, the amendments made to Claim 1, especially the replacing of 'comprising' by 'consisting of' are properly based on the original disclosure and do not infringe Article 123 (2) EPC. This applies also to the amendments of the description, namely the indication of document D1, adaptation to the wording of Claim 1 and linguistic clarifications.

3. The subject-matter of Claim 1 is novel over the prior art known from D1 and D2. According to D2 boron nitride is used in a volumetric ratio of 1 to 30%, which corresponds to a weight percentage lying outside the claimed range. The expression 'consisting of', which now appears in Claim 1, excludes the presence of further chemical components, such as a nitrogen-containing polymer, which is a necessary constituent of the nozzle according to D1.

4. Hence, it remains to be decided whether or not the subject-matter of Claim 1 involves an inventive step over the prior art documents D1 and D2 cited by the Examining Division.

4.1 As explained in the introduction of the present application, document D2 discloses an insulated nozzle for use in an interrupter, in which the nozzle is disposed between a pair of contacts where an arc occurs and is adapted to extinguish said arc by blowing an insulating gas onto said arc. According to D2 the insulating nozzle consists of a fluoroplastic and a volumetric ratio of 1 to 30% of boron nitride in order to improve the withstand voltage performance after repeated current interruptions. It is explained in the introduction of the present application that if the proportion of an added inorganic filler increases, the rate at which the insulated nozzle is consumed by the arc increases, resulting in deterioration in the current interruption performance. Therefore, if the proportion of the added inorganic filler is increased in order to improve the withstand voltage performance, the interruption performance after repeated current interruptions is reduced, and it is thus difficult to improve both the withstand voltage performance and the interruption performance by keeping them in balance.

Hence, starting from this prior art the problem underlying the present application is to provide an insulated nozzle for use in an interrupter in which the withstand voltage performance and the current interruption performance after repeated current interruptions can be improved in a balanced manner, and which is most suitable for frequent current interruptions.

According to Claim 1 this problem is solved in that the insulated nozzle consists of a fluoroplastic and boron nitride mixed into said fluoroplastic at a weight percent in the range of 0.3 to 1.0.

It cannot be derived from D2 that the relationship between the proportion of mixed boron nitride and the overall performance being obtained from the withstand voltage performance and the interruption performance is a maximum if the percentage of boron nitride is less than 1.0 as shown in Figure 4 of the present application.

4.2 D1 describes a nozzle a surface portion of which is made of a resin insulator obtained from a polyolefin resin (fluorocarbon resin or polyethylene) and nitrogen - containing polymers (polyimides, polyamides).

The resin insulator may further comprise any one of twenty-seven inorganic filler powders, including boron nitride, in an amount of 0.1 to 20 parts by weight, more preferably 0.1 to 10 parts by weight. It is clear from D1 (especially page 4, lines 4,5, 22; page 7, line 15; page 10, line 5; page 11, lines 4 and 5), that this filler powder is only optional and not necessary. On pages 11 and 12 and in tables 1 and 2, twenty-three examples are quoted in which ten parts of boron nitride powder are mixed with a hundred parts of PTFE and

different amounts within a range of 0.1 to 0.5 parts of a varnish of precursor of polyimide resin or a polyamide resin. Thus, as argued in the Statement of Grounds, page 2, the content of boron nitride powder is 8.7% to 9% but the amount of boron nitride in any particular sample was not deliberately chosen to see what effect it had. The variation from sample to sample was merely the result of varying the nitrogen containing polymer.

Hence, it cannot be derived from D1 that the use of a filler such as boron nitride rather than a special polymer containing nitrogen has any influence on the electrical and mechanical characteristics of the material in question.

4.3 Even a combined consideration of D1 and D2 does not lead to the claimed subject-matter.

In the light of D2 and, furthermore, in the light of the examples given in D1, a person skilled in the art would not consider it worth while to make experiments with Boron nitride in a ratio of less than 1% since he would have no reason to expect good results. A person skilled in the art trying to find a solution of the underlying problem would either follow the teaching of D2 and experiment with boron nitride in a volumetric range of 1%-30% or follow the teaching of D1 and experiment with percentages of a nitrogen-containing polymer.

Therefore, it was not obvious from these documents that the relationship between the proportion of mixed boron nitride and the overall performance being obtained from the withstand voltage performance and the interruption performance had a maximum with the percentage of boron nitride less than 1,0 as shown in Figure 4 of the present application.

4.4 Hence, in the Board's judgement the subject-matter of Claim 1 involves an inventive step in the sense of Article 56 EPC.

4.5 Dependent Claim 2, according to which the proportion of boron nitride is limited to a small optimum range within the range of boron nitride in Claim 1, is likewise allowable.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent on the basis of the documents indicated in paragraph II above.

The Registrar: The Chairman:

M. Kiehl E. Persson