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Bezeichnung der Erfindung: Beryllium-containing iron-boron glassy magnetic alloys
Title of invention:
Titre de l'invention :

ENTSCHEIDUNG / DECISION
vom / of / du 5 June 1984

Anmelder/Patentinhaber:
Applicant/Proprietor of the patent: ALLIED CORPORATION
Demandeur/Titulaire du brevet :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Rule 27 (1) (d)

"Determination of technical problem"

Leitsatz / Headnote / Sommaire

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Case Number: T 113 / 83

DECISION

of the Technical Board of Appeal 3.3.1

of 5 June 1984

Appellant: (Opponent)
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Representative:

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Decision under appeal: Decision of the Opposition Division of the European Patent Office dated 24 May 1983 rejecting the opposition filed against European patent N°.0004546 pursuant to Article 102 (2) EPC

Composition of the Board:

Chairman: D. Cadman
Member: K. Jahn
Member: O. Bossung

SUMMARY OF FACTS AND SUBMISSIONS

I. On European Patent application No. 79 100 560.0 filed on 23 February 1979, claiming the priority from a prior US application of 10 April 1978, a patent was granted on 4 November 1981 on the basis of six claims reading as follows:

"1. A beryllium-substituted, iron-boron, primarily glassy magnetic alloy consisting essentially of 10 to 18 atom percent boron, 2 to 10 atom percent beryllium and 72 to 80 atom percent iron plus incidental impurities.

2. The alloy of claim 1 in which the beryllium content ranges from 2 to 6 atom percent.

3. The alloy of claim 2 in which the beryllium content is about 2 atom percent.

4. The alloy of claim 1 consisting essentially of about 18 atom percent boron, 2 to 10 atom percent beryllium and 80 to 72 atom percent iron plus incidental impurities.

5. The alloy of claim 1 consisting essentially of 2 to 10 atom percent beryllium, 18 to 10 atom percent boron and about 80 percent iron plus incidental impurities.

6. The alloy of claim 1 which is substantially glassy."

II. On 6 July 1982 notice of opposition to the grant of the European patent was filed and revocation of the patent was requested. DE-A- 2 364 131 (1) and P. Duwez, FIZIKA2, Suppl. 2 (1970), pages 1.1 to 1.15 (2) were cited to support the alleged lack of novelty and inventive step.

III. By a decision dated 24 May 1983 the opposition was rejected and the patent maintained unamended. As stated in this decision (1) discloses amorphous alloys having a broad range of components together with a large number of possible alloying elements and, therefore, cannot take away novelty of the specific selection as claimed.

The object of the invention is the improvement of thermal stability while substantially retaining the saturation magnetisation. There is in none of the cited documents a hint given to select out of the known range of compositions a specific range limited to iron, boron and beryllium.

Such a limitation is not at all obvious for a skilled person since the large number of possible combinations disclosed in (1) does not allow a carefully directed selection. Moreover, the general discussion to be found in (2) gives no guide which would lead to the selection as claimed.

IV. On 9 July 1983 the opponent lodged an appeal against the abovementioned decision with subsequent payment of the appeal fee on 14 July 1983 followed on 22 September 1983 by a Statement of Grounds, the essence of which was that the technical problem underlying the

alleged invention could not have been to select from (1) an alloy having an improved thermal stability without substantial loss of saturation magnetisation, but to modify the binary iron-boron alloys which are disclosed in US-A-4 036 639 (3) and combine already excellent magnetic properties with high thermal stability. In view of the teaching according to (1) that thermal stability of amorphous alloys can be improved by adding an element of the group comprising aluminium, silicon, tin, antimony germanium, indium and beryllium, it was obvious to try each of them and to verify whether the properties sought would be found. In doing so, no technical difficulties had to be mastered which would justify the scope of the patent protection claimed.

V. The patentee submits that the new line of argument be rejected since no indication can be found anywhere in the references of record which would indicate how the increase in thermal stability (crystallisation temperature, could be achieved with minimal reduction of saturation magnetisation.

REASONS FOR THE DECISION

1. The appeal is in accordance with Articles 106-108 and Rule 64 EPC; it is therefore admissible.

2. The question whether Claim 6 is superfluous in view of Claim 1, as the opponent submits, can be left in abeyance having regard to the advanced stage of opposition proceedings in which formal objections are of minor importance (cf. Articles 100 and 102(1) and (2) EPC):

3. According to the introductory part of the description of the European patent in suit, the invention starts from the binary iron-boron glassy alloys which have been disclosed in (3) as having good mechanical thermal and magnetic properties. In citing a not-prepublished document it is said in the application that attempts have been made, without success, to increase the thermal stability of these alloys while maintaning the saturation magnetisation (cf. page 2 lines 12 to 15 and lines 27 to 29). In connection therewith, the summary of the invention states that the introduction of beryllium into these alloys improves the thermal stability while retaining the saturation magnetisation of the base alloy. Evidently it was the statement of this effect on which the first instance relied in assessing the inventive step of the subject-matter of the patent opposed to (cf. page 3 paragraph 5 of the decision).

4. The Board has made it clear in several decisions before assessing inventive step the technical problem underlying the invention has to be determined on the basis of objective criteria. For this purpose, first of all the state of the art closest to the invention must be determined. In the Board's view, document (1) is not suited for the purpose, since ternary iron-boron-beryllium alloys are considered not to be specifically disclosed therein. In contrast to document (1), document (3) discloses certain binary iron-boron alloys from which the claimed alloys differ, in the main, by the additional element beryllium. From the cited documents, therefore, (3) is considered to represent the state of the art closest to the invention.

5. Moreover, a proper determination of the technical problem requires a comparison of the result effectively achieved by the invention over the prior art. According to document (3) the binary alloys exhibit a cristallisation temperature ranging from about 454 to 485°C, corresponding to 727-759°K, and a saturation magnetisation between 10.8 and 16.1 K Gauss (cf. column 2 lines 28 to 35). The values seem in harmony with the data depicted in tables I and II, albeit saturation magnetisation is partly measured in a different unit, namely emu/g, and figures up to 194.5, 189.5 and 179.8 emu/g.

This good result cannot be attained by the ternary alloys as claimed, since they evidence only a crystallisation temperature ranging from 640 to 752°K and a saturation magnetisation between 141 and 168 emu/g. It may be questioned whether the above-mentioned values of the saturation magnetisation are given in emu/g. It may also be questioned whether the above-mentioned values of the saturation magnetisation given in emu/g are exactly comparable in view of the different temperatures at which they were determined (4.2°K according to (3) in contrast to room temperature according the to the invention). This, however, can be left in abeyance, since the applicant does not claim to achieve an improvement in this respect, but admits a corresponding deterioration in magnetic properties up to 9% (c.f. page 2 lines 18 to 20 and page 3 lines 18 to 25 of the patent specification).

It follows from this that the alleged improvement of the crystallisation temperature while substantially

retaining the saturation magnetisation cannot be achieved and, hence, fails to qualify for the determination of the technical problem underlying the invention.

6. Besides, the patentee did not in the end contend that the alleged improvement can be claimed for ternary alloys of the invention, but rather admitted that some of them may have lower crystallisation temperatures and saturation magnetisation than the binary iron-boron alloys according to (3) (cf. the patentee's letter dated 30 January 1984 page 2 paragraph 2). In harmony with that, even the European patent specification mentions that most the alloys of the invention exibit the said improvement (cf. page 3 lines 16/17). In contrast to these statements, the claimed alloys fail to evince, on the basis of facts before the Board, a higher crystallisation temperature altogether than the known alloys according to (3).

Possibly the inconsistency between the alleged improvement and the above-mentioned facts may be resolved if the patentee could provide evidence that the measuring methods to determine the crystallisation temperature in (3), on the one hand and in the patent in suit, on the other, were different. While it is clear from (3) that differential thermal analysis (DTA) was used therefor, it cannot be gathered from the description of the patent in suit whether this test or a magnetic method was applied (page 2 lines 32 to 49 in connection with the tables and figures). The hint in the paragraph "Examples" according to which the ribbons prepared from the alloys were checked for glassiness by X-ray diffraction and DTA points rather

to that method in measuring crystallisation temperature.

7. But even if proof could be provided that the crystallisation temperature of the ternary alloys was measured thermomagnetically, the graph T_c in figure 1 for alloys having the general formula $Fe_{80}Be_xB_{20-x}$ evidences that three alloys where x means 6,8 an 10 exhibit a lower crystallisation temperature than the alloy $Fe_{80}B_{20}$ (x=0) which is known from (3) c.f. tables I and II). There is no evidence at hand that these alloys exhibit a worthwhile and significant effect of a different kind which would qualify for a technical problem.

8. Moreover, it remains an open question on which effect, if any, the other claimed, but not untested alloys could effectively rely.

9. As pointed out, there are some substantial questions to be answered before inventive step can be assessed completely. The clarification of these questions should form an essential part of a proper examination proceeding and, therefore, falls within the competence of the first instance. Where such questions have been neglected in granting proceedings it must be the object of that instance to make good the omissions during opposition procedure.

Under these circumstances the Board deems it not timely to decide on the substantive issue, but makes use of its power given by Article 111(1) EPC to remit the case to the first instance for further prosecution.

ORDER

For these reasons,

it is decided that:

1. The decision of the Opposition Division of the European Patent Office is set aside.

2. The case is remitted to the Opposition Division for further prosecution.

J. Rhee D. Cadman

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