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**Datasheet for the decision
of 15 April 2013**

Case Number: T 0137/11 - 3.2.08
Application Number: 05256818.5
Publication Number: 1657317
IPC: C22C 14/00, C22C 32/00
Language of the proceedings: EN

Title of invention:

Article having a dispersion of ultrafine titanium boride particles in a titanium-base matrix

Applicant:

GENERAL ELECTRIC COMPANY

Headword:

-

Relevant legal provisions:

EPC Art. 54, 84, 123(2)

Keyword:

"Main request: novelty of claim 1 (yes) - after amendment"

Decisions cited:

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Catchword:

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Case Number: T 0137/11 - 3.2.08

DECISION
of the Technical Board of Appeal 3.2.08
of 15 April 2013

Appellant: GENERAL ELECTRIC COMPANY
(Applicant) 1 River Road
Schenectady, NY 12345 (US)

Representative: Bedford, Grant Richard
Global Patent Operation - Europe
GE International Inc.
15 John Adam Street
London WC2N 6LU (GB)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 2 July 2010
refusing European patent application
No. 05256818.5 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: M. Alvazzi Delfrate
Members: R. Ries
D. T. Keeling

Summary of Facts and Submissions

- I. In its decision posted on 2 July 2010 the examining division refused European application No. 05 256 818.5.

The examining division found that the subject matter of claim 1 then on file was anticipated by the technical disclosure of either document

D1: EP-A-1 101 831 or

D3: EP-A-0 751 228

and therefore lacked novelty.

- II. The appellant (applicant) lodged an appeal against this decision. The appeal was received at the European Patent Office on 7 September 2010 and the appeal fee was paid on the same date.

The statement setting out the grounds of appeal was received on 12 November 2010. Enclosed therewith, the appellant submitted a primary request and first to fourth auxiliary requests.

In response to the official communication annexed to the summons for oral proceedings, wherein the Board gave its provisional view on the case, and in a further response to a telephone conversation with the rapporteur, the appellant requested that prosecution of the application be proceeded with on the basis of the claims of the fourth auxiliary request submitted on 11 April 2013. Should the Board be minded to remit the application to the department of first instance for

further prosecution, the primary and first to third auxiliary requests submitted on 12 November 2010 were withdrawn.

Oral proceedings were requested, should a negative decision be contemplated by the Board.

III. Independent claim 1 of the fourth auxiliary request, now main request, reads as follows:

"An article (20) comprising a microscale composite material (21) having a titanium-base composition matrix (22) comprising more titanium by weight than any other element;

a dispersion of titanium boride particles (24, 25) in the titanium-base composition matrix (22), characterised in that at least 50 volume percent of the intragranular titanium boride particles (24) have a maximum dimension of less than 2 micrometers; wherein:

boron is present at a level in excess of its room temperature solid solubility in the titanium-base composition, up to a level required to form no more than 90 percent by volume titanium boride, and wherein:

the titanium-base composition matrix (24) is polycrystalline; and wherein:

the intragranular titanium boride particles (24) within each grain (30) are coherent or partially coherent with the titanium-base composition matrix (22) of said grain (30)."

Dependent claims 2 to 12 relate to preferred embodiments of the article set out in claim 1.

IV. The appellant's arguments are summarized as follows:

The subject matter of claim 1 of the main request resulted from a combination of claims 1 and 6 as originally filed. Neither D1 nor D3 disclosed the subject matter set out in independent claim 1 including the feature that the titanium-base composition was polycrystalline and wherein the intragranular titanium boride articles within each grain were coherent or partially coherent with the titanium-base composition matrix of said grain.

The subject matter of claim 1 of the main request was therefore novel.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments; Article 123(2) EPC*

The subject-matter of amended claim 1 of the main request results from a combination of originally filed claims 1 and 6 and the technical information given on page 4, last paragraph to page 5, first paragraph of the application as filed.

Dependent claims 2 to 8 correspond to originally filed claims 2 to 4, 7, 8 and 10, respectively, and dependent claims 9 to 11 have a basis in the technical details given on page 3, last paragraph of the application as originally filed. Claim 12 finds support on page 12, last paragraph of the application as filed.

Hence, there are no formal objections to the claims with respect to Article 123(2) EPC.

3. *Interpretation of claim 1*

Claim 1 of the main request relates to a composite material comprising:

- (a) a polycrystalline titanium-base composition matrix (Ti > 50 wt %);
- (b) boron in excess of its room temperature solid solubility in the Ti-base composition matrix up to a level to form not more than 90 vol% Ti-boride dispersed in the matrix;
- (c) with ≥ 50 vol% of the intragranular titanium boride particles (24) being $< 2 \mu\text{m}$ in size and wherein
- (d) the intragranular titanium boride particles (24) within each grain (30) are coherent or partially coherent with the titanium-base composition matrix (22) of said grain.

4. *Novelty; Article 54(2) EPC*

- 4.1 Document D1 is concerned with a powder-metallurgically produced composite material consisting of a Ti-base matrix (Ti > 50 wt %) and a particle element powder dispersed in the matrix (D1, claim 1). The particle element powder, an example of which is titanium boride having TiB_2 as a major component, exhibits an average particle diameter ranging from 0.5 to 50 μm or, more preferably, from 0.5 or 1 to 30 μm (D1, claim 15; paragraphs [0059], [0066], [0082], [0084]). It is evident from the examples given in D1, Tables 1 and 2 that the TiB_2 particles in the matrix are present in

amounts between 1 to 10 vol% (Table 1) or 5 to 15 vol% (Table 2), respectively. The process of producing the known Ti-base composite material comprises the steps of mixing a prepared Ti-powder, alloying element powder and particle element powder, forming a green compact e.g. by cold isostatic pressing and sintering the compact at the β transformation temperature or above. The final composite is, therefore, expected to exhibit a polycrystalline structure wherein the titanium boride particles are uniformly dispersed (D1, paragraphs [0086] to [0092]; [0097], [0100]).

However, the article known from document D1 is not disclosed to exhibit feature (d) of the claimed composite article which requires that the intragranular titanium boride particles within each grain are coherent or partially coherent with the titanium-base composition matrix of said grain.

- 4.2 Document D3 discloses a TiAl master alloy consisting of a 50-53at% Ti - 47-50at% Al intermetallic compound (50at% Ti - 50at% Al \equiv 61,5wt% Ti-38.5 wt% Al matrix composition) which comprises fine Al_2O_3 - and TiB_2 -particles dispersed therein (D3, claim 3). The TiB_2 -particles are specified to result in a boron concentration of 0.1 to 10 at% and the diameter of the TiB_2 particle is specified to be not more than 500 nm (0.5 μm), (D3, claim 3; page 2, lines 53 to 57). It is evident from D3, examples 3 to 5 that, by using the twin-roll direct casting process for casting the TiAl-master alloy with 1 at% TiB_2 dispersed therein, a Ti-base composition matrix having a grain diameter of 20 μm or even 10 μm is achieved (D3, page 6, lines 43 to 45, page 8, lines 56 to page 9, line 2; page 9,

lines 56 to 59). However, document D3 also fails to disclose feature (d) of claim 1 of the main request.

- 4.3 For these reasons, the Board concludes that the article set out in claim 1 of the main request is novel vis-à-vis the technical disclosure of documents D1 or D3, respectively, in accordance with Article 54(2) EPC.

The same reasoning applies to the remaining claims 2 to 12 in view of their dependency on claim 1.

5. *Remittal*

Given that the ground of lack of novelty relied on in the decision of the examining division for refusing the application no longer applies, the decision under appeal must be set aside.

The examining division has not yet examined whether the application as amended meets the requirement of inventive step pursuant to Article 56 EPC. The Board, in accordance with the appellant's request, finds it appropriate therefore to remit the case to the department of first instance for further prosecution.

6. Since the request for oral proceedings was conditional on the intention of the Board to issue a negative decision, which condition is not met, no oral proceedings are necessary.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:

V. Commare

M. Alvazzi Delfrate