

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 13 January 2010**

Case Number: T 0981/07 - 3.2.08

Application Number: 02254627.9

Publication Number: 1273674

IPC: C22F 1/18

Language of the proceedings: EN

Title of invention:

Heat treatment of titanium-alloy article having martensitic structure

Applicant:

GENERAL ELECTRIC COMPANY

Headword:

-

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step (yes - after amendments)"

Decisions cited:

-

Catchword:

-

Case Number: T 0981/07 - 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 13 January 2010

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

Representative: Szary, Anne Catherine
London Patent Operation
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 12 January 2007
refusing European patent application
No. 02254627.9 pursuant to Article 97(1)
EPC(1973).

Composition of the Board:

Chairman: T. Kriner
Members: M. Alvazzi Delfrate
U. Tronser

Summary of Facts and Submissions

I. The appellant lodged an appeal against the decision of the examining division, posted on 12 January 2007, to refuse European patent application 02254627.9. The notice of appeal was filed on 9 March 2007, paying the appeal fee on the same day. The statement setting out the grounds for appeal was received on 22 May 2007.

II. The examining division held that the subject-matter of the independent claims then on file did not involve an inventive step in view of either of

D1: US-A- 4 053 330; or

D3: JP-A- 61 106 758 and Derwent abstract

in conjunction with

D2: EP-A- 921 207.

III. Subsequent to a telephone conversation with the rapporteur, the appellant requested that the appealed decision be set aside and a patent be granted on the basis of claims 1 to 9 submitted with letter dated 2 October 2009, description pages 1, 2, 2a, 3-4, 6, 8 submitted with letter dated 29 October 2004 and pages 2b, 5, 7 and 9 submitted with letter dated 2 October 2009, Figures 1-3 as originally filed.

IV. Claim 1 according to this request reads as follows:

"A method for heat treating an article, comprising the steps of:

providing an article formed of an alpha-beta titanium-base alloy;
processing the article to form a martensitic structure therein, the step of processing including the steps of first heating the article to a first-heating temperature of greater than 871°C (1600°F), and thereafter
first cooling the article to a temperature of less than 427°C (800°F); thereafter
second heating the article to a second-heating temperature of 732°C (1350°F) for a time of from 4 to 6 hours; and thereafter
second cooling the article to a temperature of less than 427°C (800°F) at a second cooling rate that does not exceed 8.3°C/s (15°F per second)."

Reasons for the Decision

1. The appeal is admissible.
2. Inventive step.
 - 2.1 The most relevant state of the art is represented by D3, relating to the treating of an alloy wherein martensite is formed by cooling after treating in the alpha-beta region (see abstract) and wherein the treating of the martensite involves heating to a temperature in the range 600°C-800°C, for instance at 705°C (see examples).
 - 2.2 D1 is less relevant since it discloses either an "invention process" (see claim 1 and example), wherein a martensitic structure is tempered by reheating in the temperature range of 1000-1600°F (about 538 °C to about

871 °C) with an example at 1100°F (about 593 °C), or a "conventional process", which involves forging followed by heat treatments in the alpha beta field and by cooling to room temperature, without mentioning the formation of martensite after the forging step.

- 2.3 D2 is even less relevant since it discloses a process wherein, during the cooling after solution treating, the formation of martensite should be minimized (see paragraph [0020]).
- 2.4 Starting from the method disclosed in D3 the object to be achieved by the present invention can be seen in providing a method capable of realising articles with a range of section thicknesses, wherein fatigue resistance in the thicker sections and damage tolerance in the thinner sections are required (see paragraphs [0002] to [0005]).

According to claim 1 this is achieved by second heating the article to a second-heating temperature of 732°C (1350°F) for a time of from 4 to 6 hours and thereafter second cooling the article to a temperature of less than 427°C (800°F) at a second cooling rate that does not exceed 8.3°C/s (15°F per second). The conditions of the second heating, in combination with the cooling rate, as discussed in the application in paragraphs [0019], [0020] and [0024], realise a compromise of high strength and fatigue resistance in the thicker portions of the articles and improved ductility and damage tolerance in the thinner portions.

The cited prior art does not provide any indication to adopt the second heating and cooling conditions

according to claim 1 when starting from a method as disclosed in D3. D3 does not relate to the problem of articles having different thicknesses and rather suggests working with shorter times and lower temperatures (see examples and page 5, line 5-8). D1 does not relate to the problem above and exemplifies the tempering of martensite at a lower temperature. D2 also does not disclose the conditions of the second heating according to claim 1 and additionally teaches, contrary to D3, to limit the formation of martensite after solution treating.

Therefore, the subject-matter of claim 1 is not obvious having regard to the present state of the art, and involves an inventive step.

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 with the order to grant a patent on the basis of
 - claims 1 to 9 submitted with letter dated 2 October 2009;
 - description pages 1,2,2a,3-4,6 and 8 submitted with letter dated 29 October 2004 and pages 2b,5,7 and 9 submitted with letter dated 2 October 2009;
 - Figures 1-3 as originally filed.

The Registrar:

The Chairman:

V. Commare

T. Kriner