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**Datasheet for the decision
of 10 September 2013**

Case Number: T 0952/12 - 3.2.07

Application Number: 07112484.6

Publication Number: 2014785

IPC: C23C 10/20

Language of the proceedings: EN

Title of invention:

Method for aluminizing serpentine cooling passages of jet engine blades

Applicant:

GENERAL ELECTRIC COMPANY

Headword:

-

Relevant legal provisions:

EPC Art. 56,
EPC R. 115(2)
RPBA Art. 15(3)

Keyword:

"Oral proceedings held in the absence of the appellant"
"Inventive step (no)"

Decisions cited:

T 1704/06

Catchword:

-



Case Number: T 0952/12 - 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 10 September 2013

Appellant: GENERAL ELECTRIC COMPANY
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Representative: Szary, Anne Catherine
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 7 December 2011
refusing European patent application
No. 07112484.6 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: H. Meinders
Members: H. Hahn
E. Kossonakou

Summary of Facts and Submissions

I. The applicant lodged an appeal against the decision of the Examining Division to refuse the European patent application No. 07 112 484.6.

II. The following documents of the examination proceedings are relevant for the present decision:

D1 = EP-A-1 591 552

D2 = EP-A-1 065 296

III. The Examining Division decided at the oral proceedings of 15 November 2011, held in the absence of the applicant, that the claims 1 to 10 of the single request dated 14 October 2011 met the requirements of Articles 123(2) EPC. It further considered that the subject-matter of claim 1 of the single request was novel with respect to D1 and D2 but that it lacked inventive step with respect to a combination of the teachings of the closest prior art D2 with D1. Therefore the application was refused under Article 56 EPC.

IV. With its statement of grounds of appeal the appellant requested that the decision be set aside and a patent be granted on the basis of the claims underlying the impugned decision, alternatively on the basis of amended claims which may be submitted in the course of the proceedings. In case the Board intended to confirm the decision to refuse the application, oral proceedings were requested.

V. Independent claim 1 of the single request dated 14 October 2011 reads as follows:

"1. A method for aluminiding an internal passage of a metal substrate comprising:

injecting a slurry composition that comprises a powder comprising aluminum, a binder selected from the group consisting of colloidal silica, an organic resin, and a combination thereof and inert organic pyrolysable thickener particles, wherein the inert organic pyrolysable thickener particles comprise polymeric microbeads of poly(methylmethacrylate), into the internal passage;

applying compressed air to the internal passage to facilitate distribution of the slurry composition throughout the internal passage; and

heat treating the slurry composition under conditions effective to remove volatile components from the composition, and to promote diffusion of aluminum into a surface of the internal passage."

VI. With a communication dated 17 May 2013 and annexed to summons for oral proceedings set for 10 September 2013 the Board presented its preliminary and non-binding opinion with respect to the claims of the single request.

The Board stated amongst others that it would be necessary to discuss in particular inventive step starting from either D1 or D2 and the common general knowledge of the person skilled in the art, as follows:

" 3. Inventive step (Article 56 EPC)

The discussion of inventive step will take account of the problem-solution approach based on the distinguishing features over the closest prior art. It appears that either D1 or D2 can be considered as the closest prior art. It will be discussed whether or not the person skilled in the art, when starting from the method of the closest prior art D1 (or alternatively D2), would have any incentive to modify it according to the teaching of D2 (or alternatively D1), and by applying his common general knowledge would arrive in an obvious manner at the subject-matter of method claim 1.

3.1 D1 can be considered to represent the closest prior art for a method for aluminiding an internal passage of superalloy metal substrates (of turbine components) comprising injecting a slurry composition comprising an aluminum-based powder, a binder selected from the group consisting of colloidal silica, at least one organic resin, and combinations thereof, and inert organic pyrolysable thickener particles (poly(methylmethacrylate) beads) into the internal passage; heat treating the composition under conditions sufficient to remove volatile components from the composition, to cause diffusion of aluminum into surface regions of the internal passage, and to cause decomposition of at least some of the pyrolysable thickener particles. The method of D1 comprises the further step of burnishing excess material from the internal passage (see claim 8; paragraphs [0015], [0016], [0018], [0038] and [0039]).

The burnishing aims to remove any excess material to avoid non-uniform distribution thereof. According to D1 said burnishing can be any convenient method, for example it can comprise inserting a burnishing tool (easiest in straight internal passages) in the internal passage, e.g. a needle; embodiments wherein burnishing comprises dissolving excess material can be used in straight or curved internal passages, e.g. it may comprise chemically burnishing the excess material using sodium hydroxide at 0.5 N (see paragraph [0042]).

3.1.1 The difference between the method of D1, wherein the slurry is also injected into the internal passages and claim 1 of the application is that compressed air is applied to the internal passage to facilitate distribution of the slurry composition throughout the internal passage. However, it is clear from the present application that "Compressed air is applied to the passage or cavity to distribute the injected slurry throughout the passage or cavity" but also that "the compressed air also expels excess slurry from the passage or cavity" (see page 14, last paragraph). Thus it is evident from the present application that expelling excess slurry from the passage by blowing compressed air through the internal passageway includes that the slurry at the same time is distributed throughout the internal surface.

3.1.2 Thus the objective problem starting from D1 can be defined as the provision of a more simple and economic method which avoids burnishing excess material and which can be applied to all types of cooling passageways including complex curved ones such as

serpentine passageways (compare page 2, third paragraph of the present application as originally filed).

3.1.3 D2 provides a solution to this technical problem. D2 discloses another method for aluminiding an internal surface of a substrate comprising coating a slurry on the internal surface (internal passageway extending through the substrate, preferably a superalloy substrate of turbine components; see paragraphs [0006] to [0007]), the slurry containing aluminum, and drying and heating the slurry to diffuse aluminum into the substrate (see claims 1, 2, 9, 10, 13 and paragraphs [0008] and [0012]); said method further comprising a step of flowing a gas through the internal passageway after the step of coating (see claim 3). The slurry may be coated on the internal surfaces (which includes complex curved contours such as serpentine passageways; see paragraph [0010]) by various techniques such as a plastic dropper or other dispensing means or by utilizing a pump to circulate the slurry through the passageway (see paragraph [0013]), i.e. by injection techniques. Following application of the slurry to the internal passageway, excess slurry - which tends to result in the formation of a non-uniform coating in the passageway and which may cause physical blockage thereof - is removed from it in order to obtain a uniform coating and for this purpose a flow of gas through the passageway is initiated to remove excess slurry therefrom (see paragraph [0014]). Typically ambient air or compressed air is used and applied to the inlet of the passageway to remove excess slurry via flow of forced air (see paragraph [0015]). The flow rate and duration of the gas passing through the

passageway are chosen based on several parameters but the flow rate should not be so high so as to remove too much of the slurry and leave behind too thin a coating, on the other hand, the flow rate should be high enough to ensure removal of the unwanted slurry (see paragraph [0016]).

3.1.4 Thus the person skilled in the art is taught by D2 that compressed air (air is cheaper than any other gas such as an inert gas) can be used to remove any excess slurry material and thus to avoid burnishing excess material from the internal passages. It appears that by combining the teachings of D1 and D2 the person skilled in the art arrives in an obvious manner at the subject-matter of claim 1.

3.1.5 As correctly argued by the Examining Division, by blowing compressed air through the internal passages the distribution of the slurry composition throughout the internal passage will be facilitated and this technical effect is considered to only represent a bonus effect of the air blowing step which is carried out with the intention to remove excess slurry which therefore does not contribute to inventive step (see Case Law of the Boards of Appeal of the European Patent Office, section I.D.9.8).

3.2 When accepting D2 as the closest prior art, as done by the Examining Division in the impugned decision, then claim 1 differs from the method of D2 in that the aluminiding slurry composition comprises polymeric microbeads of poly(methylmethacrylate) as inert organic pyrolysable thickener particles.

3.2.1 *These thickener particles are inert, they occupy space and are capable of vaporizing without leaving residue and are environmentally benign and their addition allows to control and change the properties of the slurry, such as the viscosity, thereby influencing the distribution of the slurry inside the internal passages (see page 12, lines 17 to 30 of the present application as originally filed).*

3.2.2 *Therefore the objective problem to be solved by the person skilled in the art starting from D2 is considered to the provision of an improved aluminiding slurry composition that facilitates a uniform distribution of the slurry in the coating of internal cooling passages (compare page 2, third paragraph of the present application as originally filed).*

3.2.3 *D1 discloses another method for aluminizing internal cooling passages comprising a slurry composition comprising inert organic pyrolysable thickener poly(methylmethacrylate) microbeads to control the viscosity of the slurry and to provide a better distribution of the slurry within the passage (page 3, paragraphs [0015] and [0016], and [0019] to [0021]; page 5, paragraphs [0037] to [0039]).*

3.2.4 *It appears to be obvious that the person skilled in the art, in order to solve the aforementioned technical problem, would apply the aluminiding slurry composition according D1 to the method for aluminizing the internal passages according to D2, and arrive at the method according to claim 1 of the single request.*

3.3 Consequently, claim 1 of the single request therefore appears to lack inventive step. The single request thus appears not to be allowable."

VII. With letter dated 9 September 2013 and submitted by fax the appellant stated that "The Applicant withdraws any request for oral proceedings and will not be attending the oral proceedings scheduled for 10 September 2013. It is requested that a written decision be issued in accordance with the current state of the file."

This letter did **not** contain any further arguments concerning the objections raised in the above mentioned Board's communication dated 17 May 2013.

VIII. Oral proceedings before the Board were held on 10 September 2013. As announced with its fax dated 9 September 2013 the appellant did not attend so that the oral proceedings were continued in its absence in accordance with Rule 115(2) EPC and Article 15(3) RPBA. At the end of the oral proceedings the Board announced its decision.

Reasons for the Decision

1. The statement of the appellant in its fax dated 9 September 2013 that it withdraws its auxiliary request for oral proceedings and that it requests a decision in accordance with the current state of the file (see point VII above) implies, as is constant jurisprudence (see Case Law of the Boards of Appeal, 6th edition 2010, VI.C.2.2), that the appellant relies on its submissions of the written proceedings.

Furthermore, although the appellant did not attend the oral proceedings the principle of the right to be heard pursuant to Article 113(1) EPC is observed since it only affords the opportunity to be heard and, by absenting itself from the oral proceedings, a party gives up that opportunity (see the explanatory note to Article 15(3) RPBA cited in T 1704/06, not published in OJ EPO; see also the Case Law of the Boards of Appeal, 6th edition 2010, VI.B.3 to VI.B.3.2).

2. In the communication accompanying the summons for oral proceedings the Board, taking account of the submissions of the appellant, has raised objections under Article 56 EPC against the single request, explaining why in the Board's opinion the subject-matter of claim 1 of this request lacks inventive step over a combination of the teachings of D1 and D2 or D2 and D1 (see point VI above).
3. The appellant did not reply in substance to these objections (see point VII above). Since there has been no attempt by the appellant to refute or overcome the objections raised in the above communication, the Board sees no reason to depart from its preliminary opinion expressed therein.
4. With regard to the above, the Board concludes - for the reasons already set out in the communication dated 17 May 2013 (see point VI above) - that the subject-matter of claim 1 of the single request lacks inventive step (Article 56 EPC).
5. Consequently, the single request is not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Nachtigall

H. Meinders