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Datasheet for the decision of 26 February 2010

Case Number: T 0438/08 - 3.2.03

Application Number: 03252630.3

Publication Number: 1358958

IPC: B22D 29/00, F01D 5/18, B22C 9/04

Language of the proceedings: EN

Title of invention:
A way to manufacture inserts for steam cooled hot gas path components

Patentee:
GENERAL ELECTRIC COMPANY

Opponent:
SIEMENS AKTIENGESELLSCHAFT

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Late-filed document admitted into the proceedings (no)"
"Inventive step - (no) - obvious combination of known features"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0438/08 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 26 February 2010

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 4 January 2008 rejecting the opposition filed against European patent No. 1358958 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: U. Krause
Members: G. Ashley
K. Garnett

Summary of Facts and Submissions

I. European patent EP-B1-1 358 958 relates to a method for manufacturing steam cooled inserts for turbines. Grant of the patent was opposed for lack of novelty or inventive step (Article 100(a) EPC). The Opposition Division was of the view that the claimed subject-matter was inventive, and thus took the decision, posted on 4 January 2008, to reject the opposition.

II. The Appellant (Opponent) filed notice of appeal on 20 February 2008, paying the appeal fee and submitting the grounds of appeal on the same day.

III. In accordance with Article 15(1) of the Rules of Procedure of the Boards of Appeal, the Board issued a summons to attend oral proceedings together with a preliminary opinion setting out its views on novelty and inventive step. In response to the summons, both parties withdrew their requests for oral proceedings.

IV. Requests

The Appellant requests that the decision under appeal be set aside and that the patent be revoked.

The Respondent (Patent Proprietor) requests that the appeal be dismissed.

V. Claims

"1. A method of forming inserts (10) for steam cooled hot gas path components in a turbine, said method comprising:

casting the geometrical configuration of the insert (10); and
laser drilling impingement holes (16) in the cast insert (10) without removing a ceramic casting core (12) of the cast insert."

Dependant claims 2 to 7 relate to preferred embodiments of the method of claim 1.

VI. Prior Art

The following documents, amongst others, were cited in the contested decision:

D1: EP-A-0 974 735
D5: US-A-3 694 264
D7: US-A-5 222 617
D12: EP-A-1 156 187
D13: US-A-4 026 659
D14: Gordon C. Oates (editor), "Aerothermodynamics of Aircraft Engine Components", pages 286 to 295, AIAA Education Series, 1985.
D15: EP-B1-1 043 479

The following document was referred to in the grounds of appeal:

D15a: EP-A1-1 043 479

VII. Submissions of the Parties

(a) Documents D15 and D15a

D15, a patent specification published on 7 December 2005, was submitted after the nine month period given in Article 99(1) EPC for filing an opposition. The Opposition Division did not admit the document into the proceedings, reasoning that firstly, it was published after the priority date of the disputed patent (24 April 2002), and secondly, it did not represent the common general knowledge of the skilled person.

In the grounds of appeal the Appellant referred to D15a, the patent application relating to D15, which was published on 11 October 2000, ie before the priority date. The Appellant argues that, since D15 corresponds to the application D15a, it was wrong of the Opposition Division to conclude that the disclosure of D15 was irrelevant for discussions concerning the state of the art and the knowledge of the skilled person at the priority date of the disputed patent.

(b) Novelty

The Appellant submits that, as claim 1 merely refers to inserts for steam cooled hot gas components in a steam turbine, the claimed subject-matter lacks novelty over D13. The wording of claim 1 does not limit the insert to being one that provides impingement cooling, but includes other inserts used in steam cooled turbine components. Consequently D13, which discloses cooled nozzle vanes for turbine engines, is relevant to the

assessment of novelty. The vanes of D13 are made up of a core, a nose insert and a tail insert; holes are cast into the parts prior to their assembly. The subject-matter of claim 1 is thus not new over the disclosure of D13.

The Respondent argues that D13 does not disclose inserts with impingement holes, as defined in claim 1 of the disputed patent. This is made clear by the description of D13 (column 2, lines 61 to 62), which explains that commonly used impingement inserts positioned within a hollow in the vane, ie of the type referred to in claim 1, are eliminated.

(c) Inventive Step

The Appellant submits that the claimed method lacks an inventive step in light of documents D7 and D13. The Respondent argues that these documents relate to turbine blades and so do not provide any teaching for the skilled person to cast impingement inserts.

The Opposition Division considered that any document, such as D1, D5, D12 or D14, which discloses the manufacture of inserts for impingement cooling of hot gas turbine components could be taken as the closest prior art, but since no document suggests the casting of impingement inserts, the claimed method involves an inventive step.

In its preliminary opinion, the Board drew attention to the fact that D1 does disclose the casting of impingement inserts, and questioned inventive step on

the basis of documents D1 and D7. Neither party filed any submissions in response to this point.

Reasons for the Decision

1. The appeal is admissible.

2. Prior Art

Document D15 was filed late in the opposition proceedings and the Opposition Division exercised its discretion under Article 114(2) EPC not to admit it into the proceedings.

Document D15 concerns a patent specification published after the priority date of the disputed patent; hence D15 does not belong to the state of the art under Article 54(2) EPC. The Opposition Division rightly stated that such a patent document also does not provide any evidence of the general knowledge of the skilled person at the priority date of the disputed patent.

In the grounds of appeal the Appellant refers to D15a, which is the patent application relating to D15 and which was published before the priority date. The Board is of the view that the content of D15 or D15a is of no more relevance than that of the prior art documents filed with the notice of opposition. The Opposition Division has therefore exercised its discretion correctly and neither D15 nor D15a is admitted into the proceedings.

3. Novelty (Article 54 EPC)

The Appellant alleges that the subject-matter of claim 1 lacks novelty in light of D13.

Claim 1 defines a method for forming inserts for steam cooled hot gas path components in a turbine, and comprises the step of laser drilling holes in the cast insert without removing the ceramic casting core.

D13 relates to cooled vanes for nozzles that direct combustion gases in turbine engines. The vanes are comprised of a nose, core and tail sections, which are referred to in D13 as "inserts"; the tail insert is provided with holes through which cooling air flows. D13 discloses that the holes are cast or readily drilled into the parts prior to assembly (column 2, lines 39 to 40). However, there is no mention in D13 that the holes are laser drilled into the casting without removing the ceramic casting core, as is required by claim 1. The claimed method is therefore novel with respect to D13.

4. Inventive Step (Article 56 EPC)

4.1 Since the invention relates to the manufacture of inserts for steam cooled hot gas path components, the Opposition Division argued that any document disclosing a method for making such inserts, eg D1, D5, D12 or D14, could be considered as the closest prior art. The Board agrees with this approach, but sees D1 as being of particular relevance.

4.2 D1 relates to impingement cooling of components in gas turbine engines (paragraph [0001]). This is achieved by providing an insert, referred to as a "baffle" in D1, which has a plurality of holes through which cooling air is directed (paragraph [0005]). Although claim 1 refers to inserts for steam rather than air cooled components, this would be of little relevance to a skilled person, who is concerned primarily with the manufacture of the inserts rather than with the cooling process *per se*. D1 is therefore seen as an appropriate starting point for the assessment of inventive step.

4.3 D1 explains (see paragraph [0025]) that the insert can either be made from sheet metal or can be cast. In the case of a sheet metal insert the holes are punched out, but D1 does not say how the holes are formed in the cast insert. Therefore starting from D1, the objective problem to be solved is how to make holes in the cast insert.

4.4 The proposed solution given in claim 1 of the disputed patent is to form the holes by laser drilling without removing a ceramic casting core. This provides for accurate and precise drilling combined with improved processing times (paragraph [0004] of the patent specification).

4.5 Of relevance here is D7, which concerns the drilling of cooling holes in hollow turbine blades. Although D7 does not specifically refer to cooling inserts for turbine components, these are considered to be technically so closely related to turbine blades that the skilled person would be expected to have knowledge of both.

Like the disputed patent, D7 addresses the difficulty of drilling holes both accurately and efficiently (see column 1, lines 22 to 24 and 28), and teaches that the difficulty can be overcome by laser drilling. The disadvantage of using a laser, however, is that when the hole has been created, there is risk of the laser beam striking and damaging the back wall of the cast component. According to D7 this problem is solved by casting around a ceramic core, which is then left *in situ* to act as a backing material for the laser drilling; once drilling is completed, the casting core is removed by leaching (see D7, column 1, line 66 to column 2, line 6 and column 2, lines 41 to 43). This is precisely the technique described in the disputed patent.

4.6 In summary, starting from D1 and faced with the problem of how to create the holes in the cast inserts, the skilled person is taught by D7 that the holes can be drilled accurately and efficiently by using a laser, provided that a ceramic casting core is left in place and only removed on completion of drilling. The method of claim 1 thus lacks an inventive step in light of documents D1 and D7.

4.7 The Opposition Division concluded (last paragraph on page 5 of the disputed decision) that none of the available prior art (documents) discloses or suggests casting of impingement inserts, so there is no hint to modify the known methods so as to arrive at the claimed invention. The Board disagrees with this conclusion, as D1 expressly states that the insert or baffle can be

cast (paragraph [0025]); consequently there is a hint, provided by D7, to modify the known method of D1.

Similarly, the Board does not agree with the submission of the Respondent that D7 relates to turbine blades and hence does not provide any teaching for the skilled person to cast impingement inserts; as set out above, this teaching is given in D1.

4.8 Since the method of claim 1 lacks an inventive step with respect to D1 and D7, it is not necessary to consider the Appellant's submissions based on documents D7 and D13.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

A. Counillon U. Krause