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**Datasheet for the decision
of 2 May 2018**

Case Number: T 1571/15 - 3.2.08

Application Number: 04807451.2

Publication Number: 1715068

IPC: C22C19/05

Language of the proceedings: EN

Title of invention:

NICKEL-BASED SUPER-HEAT-RESISTANT ALLOY AND GAS TURBINE
COMPONENT USING SAME

Patent Proprietor:

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Opponent:

Siemens Aktiengesellschaft

Headword:

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

Novelty
Inventive step

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1571/15 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 2 May 2018

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 6 July 2015
rejecting the opposition filed against European
patent No. 1715068 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairwoman P. Acton
Members: M. Alvazzi Delfrate
 P. Schmitz

Summary of Facts and Submissions

- I. By its decision posted on 6 July 2015 the opposition division rejected the opposition against European patent No. 1 715 068.
- II. The appellant (opponent) lodged an appeal against this decision in the prescribed form and within the prescribed time limits.
- III. Oral proceedings before the Board of Appeal were held on 2 May 2018.

The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondents (patent proprietors) requested that the appeal be dismissed, i.e. that the patent be maintained as granted or, in the alternative, that it be maintained on the basis of the first auxiliary request filed with letter of 26 February 2016.

- IV. Claim 1 of the main request (patent as granted) reads as follows:

"A Ni-base superalloy consisting of:

by weight %, Co: 9 to 11%, Cr: 9 to 12%, Mo: up to 1%, W: 6 to 9%, Al: 4 to 5%, Ti: 4 to 5%, Nb: up to 1%, Ta: up to 3%, Hf: 0.5 to 2.5%, Re: up to 3%, C: 0.05 to 0.15%, B: 0.005 to 0.015%, Zr: up to 0.05%, and the balance of Ni and inevitable impurities."

The auxiliary request is not relevant for the present decision.

V. The following documents played a role for the present decision:

D1: WO -A- 01/64964;

D2: EP -A- 0 637 476;

D6: DE -A- 23 33 775;

D10: US -A- 5,395,584; and

A1: "Patentee's observations" filed in opposition proceedings on 14 October 2013.

VI. The arguments of the appellant can be summarised as follows:

Novelty

D1 disclosed a composition which overlapped with the composition as claimed. Since the composition of D1 was developed starting from the commercial Rene N4 alloy and adjusting the contents of Hf and B, the person skilled in the art would have worked for all the other elements in the whole range disclosed in D1. Hence, he would have seriously contemplated working in the claimed range. In respect of the Ti content, it was additionally pointed out that the centre of the range of D1, i.e. the region where the person skilled in the art would always contemplate carrying out the teaching of the prior art, fell within the claimed range. For this reason too the Ti content was known from D1. The subject-matter of claim 1 was therefore known from D1.

D2 disclosed a composition which overlapped with the composition as claimed. Even if none of the examples of D2 fell within the composition of claim 1 of the main request, they taught to work in the whole composition range of D2 and, as a consequence, in the claimed

domain as well. Hence, D2 was equally novelty-destroying for the subject-matter of claim 1.

Finally, D10 was also novelty-destroying because its composition broadly overlapped with the composition as claimed.

Inventive step

Even acknowledging novelty in view of D1 of the subject-matter of claim 1 would not justify an inventive step over this document. The problem solved starting from D1 was to provide an expanded solution heat treatment range and improved high-temperature strength. D2, relating to a Ni superalloy similar to that of D1, taught to improve high-temperature strength by the addition of Co, Ta and Mo, in preferred ranges which overlapped with those claimed. As to Ti, the teaching of D1 was not limited to the preferred range; it also contemplated the broader range, which also overlapped with the claimed range. Hence, the subject-matter of claim 1 lacked an inventive step in view of the combination of D1 and D2.

Also starting from D6, the claimed alloy lacked an inventive step. The only element in the claimed composition with a content which did not overlap with that claimed was Ta, with a content higher than in the patent in suit. D2 disclosed not only the favourable effect of Ta on mechanical strength, but also the disadvantages of an excessive amount of Ta. Hence, it was obvious to keep its content in the preferred range of D2, thus working in the range claimed in the patent. Therefore, the subject-matter of claim 1 was also obvious in view of the combination of D6 and D2.

VII. The arguments of the respondents can be summarised as follows:

Novelty

D1 provided a clear teaching of what was the preferred composition. Hence, the person skilled in the art would not seriously contemplate working outside said preferred composition, which exhibited Co, Ti, Mo and Ta contents which differed from those of present claim 1. Hence, D1 was not novelty-destroying.

The same was true of D2. In order to arrive at the claimed composition starting from D2, multiple selections were necessary. Moreover, none of the examples fell in the claimed ranges, so that the person skilled in the art would not seriously contemplate working in the domain of claim 1.

As to D10, both the compositions disclosed in column 3 of the table were different from the composition as claimed.

The subject-matter of claim 1 was therefore novel.

Inventive step

The claimed alloy was also inventive starting from D1. The problem solved starting from this document was to improve not only high-temperatures strength but also corrosion resistance. Document A1 provided evidence of this effect. Since D2 did not relate to this problem, the person skilled in the art would not have considered its teaching. Moreover, even if he had he would not have considered some parts of its teaching only, while ignoring others, such as that concerning Ti, with a

preferred range and examples outside the claimed composition. Thus, it was not obvious to arrive at the subject-matter of claim 1 starting from D1.

Starting from D6, the claimed alloy was distinguished by a number of features which solved the same problem as above. The person skilled in the art would not have chosen D2 to solve said problem and would not have been motivated to choose the teaching relating to one specific element without taking into account other features of D2 and D6.

The claimed subject-matter thus involved an inventive step.

Reasons for the Decision

1. Main request - novelty

The following table provides an overview of the claimed composition as compared with compositions (in wt%) according to D1, D2 and D10 (which were cited against novelty) and D6 (which was cited as a starting point for inventive step).

Element	claim 1	D1 (claim 1)	D2 (claim 7)	D10 (col. 3)	D10 (claim 1)	D6 (claim 1)
Co	9-11	5.0-15.0	≤10.5	2.5-12.5	3.0-7.5	8-12
Cr	9-12	7.0-12.0	5-14	6.0-17.0	6.0-10.0	11-15
Mo	≤1	1.0-5.0	≤6	0.5-7.0	0.5-4.0	1-2.5
W	6-9	3.0-12.0	2-15	1.5-8.5	1.6-2.5	3-10
Al	4-5	3.0-5.0	4-7	2.5-9.5	3.0-6.0	3-4
Ti	4-5	3.0-5.0	0.5-5	0.5-6.0	0.8-2.5	3.5-4.5
Nb	≤1	0-2.0	≤3	0.01-2.5	1.0-2.0	-
Ta	≤3	2.0-6.0	≤12	0.5-4.0	0.5-2.5	3.5-10
Hf	0.5-2.5	0-2.0	≤2	0.02-3.5	0.5-2.0	0.01-3
Re	≤3	0-10.0	≤4	1.0-4.0	2.5-3.5	-
C	0.05-0.15	0.06-0.10	≤0.20	0-0.010	0-0.003	≤0.30
B	0.005-0.015	0.008-0.013	≤0.035	0-0.004	0-0.04	0.005-0.025
Zr	≤0.05	-	≤0.035	0-0.002	0-0.0015	0.05-0.40
Ni	bal.	bal.	bal.	bal.	bal.	bal.
others				Yb 0-1.0	Yb 0.01-0.7	

1.1 D1 relates to an Ni-base superalloy and discloses a broad composition in claim 1 (see table above) and a narrower ("typical", see page 3, lines 17-18) composition in claim 5. The overlap between the

composition as claimed and the broad composition of D1 is narrow, in particular in respect of Co, Ti, Ta and Mo.

The appellant argued that the person skilled in the art would seriously contemplate working over the whole range of the broad composition of D1, because this broad composition was the same, but for the elements Hf and B, as that of the commercial alloy Rene N4, which was the starting point of D1. However, this argument disregards the fact that D1 discloses a preferred composition range, namely the composition of claim 5 and page 3, line 20 - page 4, line 7. Since the exemplary composition (last paragraph on page 9) also falls within said preferred range and there is no pointer to work outside this range, the person skilled in the art would not seriously contemplate working outside the preferred composition of D1. The contents of Co (7.00-8.00%), Ti (3.35-3.65%), Mo (1.30-1.60%), and Ta (4.60-5.00%) of the preferred composition of D1 fall outside the claimed range. Therefore, the claimed contents of Co, Ti, Mo, and Ta are not disclosed in D1.

In respect of the Ti content, the appellant also argued that the person skilled in the art would have contemplated working in the centre of the broad range of D1 (3.0-5.0%), which falls within the claimed range for this element. However, while it is true that the person skilled in the art may seriously contemplate working in the centre region of a prior art range when no other pointer (for instance in the form of examples of preferred ranges) to another region is present, this is no longer true if, as in the present case, such a pointer is present and is directed to another region. Therefore, the argument of the appellant is not persuasive.

Hence, the subject-matter of claim 1 is novel over D1, because this document does not disclose a composition with Co, Ti, Mo and Ta contents as claimed.

1.2 D2 is directed to a blade for a gas turbine defined by its geometry (claim 1). Claim 7 discloses a very broad composition for said blade. In this case too the overlap is narrow (see for instance the contents of Co, Cr, Mo, W, Ti and Ta). More specific composition ranges are disclosed in examples 1-3. None of said specific ranges would lead the person skilled in the art to work in the claimed range. In particular, none of them points to the claimed contents of Ta (all the examples exhibit contents higher than those claimed), Ti (all the examples exhibit contents lower than those claimed) or Cr (the ranges of examples 1 and 3 are lower and the range of example 2 is broader than the claimed range). Hence, D2 is not novelty-destroying either.

1.3 D10 relates to an Ni-base superalloy powder for repair, coating or re-building. Column 3 of the table discloses two compositions - a broad composition and a preferred composition - the latter corresponding to the composition which is actually claimed (claim 1). Neither of these compositions overlaps with the composition as claimed: the broad composition has a lower C content (up to 0.010) and the claimed composition has at least Co (3.0-7.5), W (1.6-2.5), C (up to 0.003) and Yb (0.01-0.7) outside the claimed ranges. Hence, D10 is not novelty-destroying either.

2. Main request - inventive step

The appellant argues lack of inventive step starting from each of D1 and D6.

2.1 The differences in view of the alloy of D1 (contents of Co, Ti, Mo and Ta) provide not only an expanded solution heat treatment range (paragraph [0020]) and improved high-temperature strength (paragraphs [0022] and [0027]), but also improved resistance to corrosion (paragraph [0025]). This is also in accordance with the results of the experiments described in A1 (page 14).

Therefore, the problem solved by the claimed invention is to provide an Ni-base superalloy with an excellent resistance to hot corrosion and high-temperature strength (paragraph [0011]).

In view of this problem, the person skilled in the art would not have consulted D2, which primarily relates to the prevention of intergranular cracking during casting and the improvement of creep strength (page 4, lines 10-12) and does not address hot corrosion resistance.

Even if he had taken D2 into consideration, he would not be led to work in the composition range of present claim 1. It is true that D2 teaches to improve high-temperature strength by adjusting the contents of Co, Ta and Mo, with preferred ranges overlapping the claimed ones (page 7, lines 42-45 and 53-57 and page 8, lines 8-12). However, it also teaches to adjust the contents of other elements, such as Ti, in order to improve high-temperature strength (page 7, lines 49-52). Although the broad range for the Ti content (0.5-5.0%) overlaps with the claimed range, the preferred range (0.5-1.0%) is well below the claimed content. Since the examples also all have a Ti content below the claimed content, the person skilled in the art would have no obvious reason to work in the claimed composition range.

Thus, it is not obvious to arrive at the claimed subject-matter starting from D1.

- 2.2 Starting from D6, the appellant submitted that the only difference was the Ta content and that this would be rendered obvious in view of D2, last paragraph on page 7.

However, the differences in view of D6 are not limited to the Ta content (which is at least 3.5% and thus higher than the content as claimed). For instance the contents of Mo, Al and Zr have only a punctual overlap with the contents as claimed, with most preferred ranges outside the claimed domain. Hence, they represent further differentiating features.

Thus, even assuming that the person skilled in that art would consider the teaching of D2 relating to Ta in order to improve strength, he would still not arrive at the claimed invention starting from D6.

Therefore, it is not obvious to arrive at the claimed subject-matter starting from D6 either.

- 2.3 The subject-matter of claim 1 therefore involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairwoman:



C. Moser

P. Acton

Decision electronically authenticated