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Datasheet for the decision of 1 March 2012

Case Number: T 0036/10 - 3.2.08

Application Number: 01904673.9

Publication Number: 1302554

IPC: C22C 14/00, C22F 1/18

Language of the proceedings: EN

Title of invention:
Titanium alloy and method for heat treatment of large-sized semifinished materials of said alloy

Patent Proprietor:
Public Stock Company "VSMPO-AVISMA Corporation"

Opponent:
Titanium Metals Corporation

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
"Novelty (no) - main request"
"Unallowable amendment - first auxiliary request"
"Inventive step (no) - second auxiliary request"

Decisions cited:
T 0201/83

Catchword:
-

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Case Number: T 0036/10 **-** 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 1 March 2012

Appellant: (Patent Proprietor)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 15 October 2009 revoking European patent No. 1302554 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman: T. Kriner
Members: R. Ries
E. Dufrasne

Summary of Facts and Submissions

I. By its decision posted on 15 October 2009 the opposition division revoked European patent No. 1 302 554. The opposition division held that claim 1 as granted was not allowable for lack of novelty in view of document

D1: V. V. Tetyukhin: "Current State of Russian Titanium Industry and VSMPO; Development of New High Strength Alloys for Aircraft and Civil Engineering", Proceedings of the 1997 International Conference on Titanium Products and Applications, 1998, ISBN: 0-935-297-24-3; International Titanium Association, 1871 Folsom Street, Suite 200, Boulder, Colorado, 80302-5714, USA, pages 37 to 41, 54.

II. The appellant (patent proprietor) lodged an appeal against this decision on 3 December 2009, paying the appeal fee on the same day. The statement setting out the grounds of appeal was filed on 25 February 2010.

III. Oral proceedings took place before the Board on 1 March 2012. The following requests were made:

The appellant requested that the decision under appeal be set aside and the patent be maintained as granted or, in the alternative, on the basis of the first or second auxiliary requests filed on 1 February 2012.

The respondent requested that the appeal be dismissed.

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

"Titanium-based alloy containing aluminum, vanadium, molybdenum, chromium, iron and titanium which distinction is that it contains components in the following proportion, % by mass:

aluminum	4.0-6.3
vanadium	4.5-5.9
molybdenum	4.5-5.9
chromium	2.0-3.6
iron	0.2-0.5
titanium	the balance

while the molybdenum equivalent $Mo_{3KB} \geq 13.8$, wherein the molybdenum equivalent is determined by the following relation:

$$Mo_{3KB} = \%Mo/1 + \%V/1.5 + \%Cr/0.6 + \%Fe/0.4."$$

Claim 1 of the first auxiliary request differs from claim 1 of the main request by the additional feature (in bold added by the Board):

"Titanium-based alloy containing... while the molybdenum equivalent **is** $Mo_{3KB} \geq 13.8$ **- 14.4**, wherein... + %Fe/0.4."

Claim 1 of the second auxiliary request further differs from claim 1 of the main request by a point-like selection of the elements of the claimed alloy (also in bold added by the Board):

"Titanium-based alloy containing aluminium, vanadium, molybdenum, chromium, iron and titanium which distinction is that it contains components in the following proportion, % by mass:

aluminium	**5.2**
vanadium	**5.1**
molybdenum	**5.0**
chromium	**3.0**
iron	**0.4**
titanium	the balance

while the molybdenum equivalent Mo_{3KB} **is 14.4**, wherein the molybdenum equivalent is determined by the following relation:

$$Mo_{3KB} = \%Mo/1 + \%V/1.5 + \%Cr/0.6 + \%Fe/0.4."$$

V. The appellant's arguments relevant to the present decision can be summarized as follows:

The composition of the titanium-based alloy claimed in the patent was defined, inter alia, by an iron content ranging from 0.2 to 0.5% and a Mo-equivalent $Mo_{3KB} \geq 13.8$. Since these features were not disclosed for the alloys in D1, novelty arose for these reasons alone.

Document D1, page 40, first paragraph, described the nominal composition of titanium alloys VT22 (Ti-5Al-5Mo-5V-1.3Cr-1.3Fe), which served as a basis for developing alloy VT22M (Ti-5Al-5Mo-5V-3Cr). It was evident that in VT22M iron was removed from alloy VT22 (i.e. was present at the impurity level, but not exceeding 0.5%), while the chromium content was

increased. Consequently, iron was a nominal constituent in alloy VT22, but not in alloy VT22M.

Moreover, alloy VT22M was unambiguously defined by exhibiting a molybdenum equivalent of 13.5, which was lower than that required for the claimed alloy (D1, page 41, 2nd paragraph and Figure 10 on page 54). It was therefore clear for the person skilled in the art reading the disclosure of document D1 that alloy VT22M was determined by three features which had to be satisfied:
(i) the nominal composition Ti-5Al-5Mo-5V-3Cr,
(ii) an iron content not exceeding 0.5% and
(iii) a Mo-equivalent of 13.5.

It was to be noted that feature (iii) was not in contradiction to feature (ii). Accordingly, the person skilled in the art putting into practice alloy VT22M would interpret the teaching of D1 without any contradiction by choosing a composition satisfying all three criteria. In consequence thereof, the skilled person would not seriously contemplate iron contents above the impurity level for alloy VT22M. Certainly, there was no incentive whatsoever to the person skilled in the art to consider a Mo-equivalent other than 13.5 associated with a higher iron content of 0.5% Fe, for example.

The subject matter of granted claim 1 according to the main request was therefore novel over D1.

As to claim 1 of the first auxiliary request, paragraphs [0014] to [0018] of the A1-published application as filed specifically described a Mo-

equivalent of 14.4 for alloy 1 exhibiting mechanical properties superior to those of comparative alloy 2 in Table 1. Hence the upper limit for the range for the Mo-equivalent claimed in the first auxiliary request was originally disclosed.

The same arguments applied to the point alloy composition set out in claim 1 of the second auxiliary request, which was based on alloy 1 of Table 1 of the application as originally filed. The claimed alloy differed from alloy VT22M by the contents of Al, V, Fe and the Mo-equivalent. Since D1 neither disclosed the claimed titanium alloy composition nor provided any incentive or pointer making it obvious for the person skilled in the art to select the point composition of the claimed titanium alloy, the subject matter of claim 1 of the second auxiliary request was novel and involved an inventive step.

VI. The respondent's arguments relevant to the present decision can be summarized as follows:

The skilled person reading document D1 would have understood the disclosure of alloy VT22M to be an alloy having a nominal composition of Ti-5Al-5Mo-5V-3Cr and an iron content which was permitted to vary between the impurity level and 0.5%. One specific embodiment of alloy VT22M was stated to have a Mo-equivalent of 13.5, as was described on page 41 and Figure 10 of D1. There was, however, no disclosure anywhere in document D1 of the formula that was used for calculating the Mo-equivalent. Calculated with the formula given in the patent at issue, the exemplified embodiment of alloy VT22M having a Mo-equivalent of 13.5 exhibited an iron

content of 0.08%. However, alloy VT22M was not restricted to this particular embodiment. Following the teaching of D1 according to which the iron content should not exceed 0.5%, the skilled person was free to permit an iron content within the whole range, irrespective of the Mo-equivalent. The maximum allowed and explicitly disclosed value for iron (0.5%) in alloy VT22M matched exactly the upper limit for iron of the claimed alloy and corresponded to a Mo-equivalent of 14.6 which was above the claimed proviso of $Mo_{3KB} \geq 13.8$. Hence, the subject matter of claim 1 as granted was anticipated by the disclosure of D1.

Turning to claim 1 of the first auxiliary request, the introduction of the upper limit of 14.4 was not disclosed independently anywhere in the application as filed but was derived from example alloy 1 in Table 1 of the patent. A range for the Mo-equivalent between ≥ 13.8 to 14.4 was not disclosed either and therefore contravened Article 123(2) EPC.

The point composition featuring in claim 1 of the second auxiliary request represented merely a workshop modification of the nominal composition of alloy VT22M. According to D1, page 41, first paragraph, alloy VT22M could provide a strength between 1200 to 1350 MPa at an elongation of more than 6% and exhibited a satisfactory ductility and crack resistance. Hence no particular technical problem was solved or technical advantage was achieved by the selected point composition.

Consequently, the subject matter claim 1 of the second auxiliary request did not involve an inventive step vis-à-vis the technical disclosure of document D1.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Document D1 discloses on page 40, first paragraph, titanium-based alloy composition VT22M, which is compared with that of the single claim of the patent at issue in the following table:

element wt%	patent at issue	D1 nominal comp. of VT22M
Al	4.0 - 6.3	5
V	4.5 - 5.9	5
Mo	4.5 - 5.9	5
Cr	2.0 - 3.6	3
Fe	0.2 - 0.5	0 - 0.5
Ti	balance	balance

The comparison shows that the contents for Al, V, Mo and Cr of alloy VT22M are within the claimed ranges and that the range for iron overlaps with the claimed range. It is also noted that the upper limit of 0.5% for iron that is permitted for alloy VT22M matches exactly the maximum limit of the claimed titanium alloy. Using the formula set out in the patent at issue, alloy VT22M which includes the maximum of 0.5% Fe, exhibits a Mo_{3KB} of 14.58 and thus satisfies the proviso of ≥ 13.8.

2.2 The appellant argued that D1 specified on page 41, second paragraph, that for alloy VT22M the Mo-

equivalent was confined to be equal to 13.5, which was lower than the claimed value of ≥ 13.8 and corresponded to an iron content of about 0.08%. In its view, the skilled person had to adhere to this value and had no reason to deviate from the specific Mo-equivalent of 13.5 by modifying the iron content within the claimed range of 0.2 to 0.5%.

2.3 The Board cannot agree. It is true that D1 discloses a Mo-equivalent of 13.5 for alloy VT22M, which could be rated as being very close to the claimed limit of 13.8, should the same formula be used for calculating it. However, document D1 does not disclose any specific formula for calculating the Mo-equivalent. It therefore remains doubtful whether the Mo-equivalent specified for both alloys could actually be compared.

Moreover, and contrary to the appellant's view, it is considered that document D1 is not restricted to the particular embodiment of a Mo-equivalent of 13.5 for alloy VT22M. Rather, the nominal composition of 5-5-5-3 VT22M alloy is allowed to comprise 0 and up to 0.5% iron, which corresponds to a Mo-equivalent between 13.33 (for 0% Fe) and 14.58 for 0.5% Fe. The Board is convinced that no prejudice existed against applying the teaching of document D1 as regards the addition of iron within the whole range of 0 to 0.5%. Contrary to the appellant's position, at least the upper limit for iron, which is explicitly disclosed in D1 and corresponds to the upper limit for iron of the claimed alloy, satisfies the proviso of Mo_{3KB} = %Mo/1 + %V/1.5 + %Cr/0.6 + %Fe/0.4 ≥ 13.8.

Hence, the titanium-based alloy set out in claim 1 of the patent as granted is anticipated by the disclosure of D1 and is consequently not novel. The main request is therefore not allowable.

3. First auxiliary request

Amended claim 1 of the first auxiliary request restricts the range for the Mo-equivalent by introducing an upper limit of 14.4, which is derived from the specific value given in exemplifying alloy 1 in Table 1 of the application as filed.

The application as filed does not disclose any upper limit for the Mo-equivalent. According to EPO practice, the amendment of a concentration range in a claim for an alloy is only allowable on the basis of a particular value described in a specific example if the skilled person could have readily recognised this value as not so closely associated with the other features of the example as to determine the effect of the invention as a whole in a unique manner and to a significant degree, as stated for instance in T 201/83. This is clearly not the case in the present situation since the Mo-equivalent in alloy 1 does not represent an independent feature. Rather, it is a direct consequence of the alloy composition and therefore closely associated with contents selected for Mo, V, Cr and Fe. This interrelationship is expressed by the formula given in the patent.

The amendment to claim 1 of the first auxiliary request thus contravenes the requirements of Article 123(2) EPC and consequently, claim 1 is not allowable.

4. Second auxiliary request

The point alloy composition featuring in claim 1 of the second auxiliary request corresponds to example alloy 1 in Table 1 of the application as filed. The Mo-equivalent of 14.4 set out in claim 1 is, however, redundant since this feature results directly from the alloy's chemistry and the formula. The contents of 5% Mo and 3% Cr of the claimed alloy exactly correspond to those of alloy VT22M, and the contents of 5.2% Al and 5.1% V are very close to the nominal amounts of 5% Al and 5% V required in alloy VT22M. In consequence thereof, the essential difference between the claimed alloy and alloy VT22M could be seen to reside in an iron content of 0.4%, which falls within the range for iron of 0 to 0.5% specified for alloy VT22M in D1.

According to paragraph [0007] of the patent specification and also in the application as filed, it is an object of the claimed titanium-based alloy to attain a higher level of strength for massive large-sized parts of 15 to 200 mm in excess thick. It is, however, noted that the ultimate tensile strength (UTS) of 1304 MPa obtained for the claimed point alloy composition 1 in Table 1 is also achieved with alloy VT22M, which can secure a strength of 1200 to 1350 MPa at an elongation of more than 6% in billets and massive forgings (D1, page 41, first paragraph).

The patent specification does not disclose any other particular technical effect which is to be associated with the selection of an iron content of 0.4% Fe and consequently, it is not possible to ascribe such a

technical effect to the presence of 0.4 % Fe. Given this situation, the iron content is rated as being arbitrarily selected and, consequently, it does not amount to a distinguishing technical feature upon which an inventive step of the titanium-based alloy set out in claim 1 of the second auxiliary request could be based.

Hence, claim 1 of the second auxiliary request is not allowable for lack of inventive step of its subject matter with respect to document D1.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

V. Commare T. Kriner