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DECISION
of 5 November 2003

Case Number: T 0601/01 - 3.2.2
Application Number: 96917452.3
Publication Number: 0828862
IPC: C22C 38/44
Language of the proceedings: EN

Title of invention:

Martensitic stainless steel having high mechanical strength
and corrosion resistance and relative manufactured articles

Patentee:

DALMINE S.p.A.

Opponent:

Edelstahl Witten Krefeld GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes) after amendment"

Decisions cited:

T 0686/91

Catchword:

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Case Number: T 0601/01 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 5 November 2003

Appellant:
(Proprietor of the patent) DALMINE S.p.A.
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Representative:
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Respondent:
(Opponent) Edelstahl Witten Krefeld GmbH
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Representative:
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 29 March 2001
revoking European patent No. 0828862 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. D. Weiß
Members: R. Ries
E. J. Dufrasne

Summary of Facts and Submissions

- I. European patent No. 0 828 862 was granted on 10 February 1999 on the basis of European patent application No. 96 917 452.3.
- II. The granted patent was opposed by the present respondent (opponent) on the grounds that its subject matter lacked novelty and did not involve an inventive step with respect to the state of the art (Article 100(a) EPC).
- III. With its decision posted on 29 March 2001, the opposition division held that the claimed subject matter of the claims of all requests lacked novelty and revoked the patent.
- IV. An appeal against this decision was filed by the patentee (appellant) on 24 May 2001. The fee for appeal was paid and the written statement setting out the grounds of appeal was filed within the time limit given in Article 108 EPC.

Of the pre-published documents considered in the opposition proceedings, only the following have been relied upon on appeal:

D1: JP-A-6041638 and translation into German language
D1a: Abstract of D1 in English language

D2: JP-A-5263138 and translation into German language
D2a: Abstract of D2 in English language

V. Enclosed with its letter dated 16 October 2002, the appellant submitted

D6: Technical Note MCM02072 of September 2002 entitled "Corrosion Tests of Martensitic Stainless Steels of Various Compositions" and

including comparative tests to the claimed martensitic steel composition.

VI. In order to meet the requests of both parties, oral proceedings before the Board were held on 5 November 2003. At the end of the oral proceedings, the following requests were made:

- The appellant (patentee) requested that the decision under appeal be set aside and the patent be maintained in amended form based on the request submitted at the oral proceedings (claims 1 to 6).
- The opponent (respondent) requested that the appeal be dismissed.

Claim 1 reads as follows:

"1. Use of a supermartensitic steel having the following ponderal percent composition: C \leq 0.05; Cr 12-15; Ni 4-7; Mo 1.5-2; N 0.06-0.12; Mn 0.5-1; Cu $<$ 0.3; P $<$ 0.02; S \leq 0.005; Al $<$ 0.02; Si \leq 1; the residue being iron and minor impurities, with the further requirement that the percentages of Cr, Mo and N satisfy the following formula: $(Cr + 3.3 \cdot Mo + 16 \cdot N) \geq 19$ for the production of articles intended for the exploitation of sour deposits of hydrocarbons which require a

resistance to stress corrosion according to NACE TM-1-77-90 method A (50 g/l NaCl; 0,5 % HAc; 50 mbar H₂S) at a threshold stress equal to 85% of the yield stress."

VII. The appellant argued as follows:

Documents D1 and D2 relate to the production of seamless tubes made of supermartensitic steels which exhibit a high toughness and stress corrosion resistance. These steels display satisfactory resistance to general corrosion and stress corrosion cracking (SCC) in a "sweet", i.e. CO₂ and NaCl-loaded, environment which comprises no or only trace amounts of hydrogen sulphide of 10 mbar at maximum. By contrast, the corrosion in so called "sour" environments comprising very high amounts of H₂S up to 500 mbar in combination with CO₂ and NaCl is much more aggressive. As pointed out in the introductory part of the description of the patent, drilling pipes which have to withstand the corrosion attack encountered in "sour" oil and gas wells have, therefore, been manufactured from super-duplex-stainless steels.

There are no grounds for concluding or implying that the authors of D1 or D2 aimed at developing super-martensitic steel alloys capable to withstand the extremely harsh corrosion attack in "sour" environments. This conclusion is corroborated by the fact that D1 and D2 do not provide any technical instruction as to how the steel compositions described therein could be adapted to render them capable in the form of structural parts to withstand the harsh corrosion conditions in a "sour" environment with H₂S as the primary corrosive agent. In fact, the steel

compositions disclosed in D1 and D2 (example 3 of D1 and example 4 of D2) failed under the corrosive attack of a "sour" environment because they either did not meet the proviso of $(Cr + 3.3 Mo + 16 N) \geq 19$ or exhibited a manganese content lower than 0.5% as stipulated in the patent (see the patentee's comparative tests, document D6). The subject matter of claim 1 therefore involves an inventive step.

VIII. The respondent's arguments are summarised as follows:

Like the patent at issue, documents D1 and D2 are concerned with supermartensitic stainless steels for flow-line purposes or drilling equipment in the exploitation of mineral oil and gas deposits. Hence, these steels are used essentially for the same purpose as claimed in the disputed patent. The known supermartensitic steel compositions which comply with the alloy defined in the patent at issue are resistant to general corrosion and to sulphide stress corrosion cracking. Although D1 and D2 in fact specify a corrosive environment including only small amounts of hydrogen sulphide (about 10 mbar H_2S in the corrosive test solution used in the examples), a skilled person could have performed further tests within the compositional ranges defined in D1 or D2 to determine those alloy compositions which are particularly resistant to withstand even harsher corrosive media, i.e. a "sour" or acid environments comprising 50 mbar H_2S or more. Such an optimization of an alloy toward a higher anti-corrosion performance satisfying the ASTM and NACE test methods and standards, and the use of such an alloy in a "sour" environment do, however, not involve an inventive step.

Reasons for the Decision

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.

2. *Amendments, Articles 123(2) EPC and 84 EPC*

Claim 1 originates from a combination of claim 1 as granted in combination with the description column 3, lines 19 to 27 and column 4, lines 38 to 51 of the patent. Except for minor editorial amendments, the dependent claims 2 to 6 correspond in substance to claims 2 to 6 as granted. Moreover, the subject matter of claim 1 is clear since it defines the composition of the alloy and the corrosive conditions the steel is used in by specifying the corrosion test method and a minimum threshold stress the products have to satisfy.

The claims as amended, therefore, meet the requirements of Articles 123(2) and 84 EPC. The respondent also did not challenge the revised wording of claims 1 to 6 in this respect.

3. *Novelty*

3.1 As regards the specific use of the steel stipulated in claim 1 of the patent in suit, novelty was not an issue in the appeal proceedings.

3.2 Concerning the most relevant documents D1 and D2, the following conclusions apply:

Both documents are concerned with the production of seamless tubes consisting of a supermartensitic stainless steel and intended to use in the oil and gas industry. Apart from a slight variation of the chromium range (D1: 11-17%; D2 11-15%) and the molybdenum range (D1: 0.5-2.0%; D2: 0.3-2.0%), the chemical composition of the steels and their heat treatment are essentially the same in D1 and D2. Both steels exhibit an excellent match in the mechanical properties and the resistance to general corrosion and sulphide stress corrosion cracking (SSCC). The description of D1 and D2 further discloses that the tubes and pipes are provided to be used in an environment which comprises high concentrations of CO₂ but very small amounts or even traces of hydrogen sulphide. As set out in the examples given in D1 and D2, the corrosion resistance of the steels was tested at 25°C in a 5% NaCl aqueous solution saturated with a gas consisting of 99% CO₂ and 1% H₂S. This hydrogen sulphide level corresponds to a concentration of 10 mbar H₂S. Based on these considerations, the corrosive conditions applied in documents D1 and D2 are rated "sweet" in contradistinction to the "sour" corrosive medium claimed in the patent at issue and comprising at least 50 mbar H₂S which specifies a hydrogen sulphide level five times as high.

- 3.3 Given that the claimed use of the supermartensitic steel is not disclosed in documents D1 or D2, the subject matter of claim 1 is novel.

4. *The closest prior art*

4.1 The determination of the disclosure which is closest to the claimed invention and therefore presents the most promising springboard for its development is essential to the assessment of inventive step. A host of jurisprudence has emerged from the Boards of Appeal on that issue according to which that disclosure qualifies as closest prior art which relates to the same or at least a similar purpose as the claimed invention and has the most relevant technical features in common (cf. Case-Law of the Boards of Appeal, 4th edition 2001, pages 102 to 105, Section 3).

It follows that a prior art disclosure not mentioning a technical problem which is at least related to that derivable from the specification under examination does not normally qualify as closest prior art, however many technical features it may have in common with the claimed subject matter (cf. T 686/91).

4.2 In the present case, the technical problem the invention sets out to solve is the provision of a steel material which can be used - in the form of pipes or tubes and without failure - in the corrosive "sour" environment encountered when exploiting hydrocarbons deposits known as "sour" oil and gas wells (cf. the patent specification column 1, lines 17 to 27; column 2, lines 40 to 44). The most promising starting point for a person skilled in the art faced with this problem is, therefore, represented by a steel material which has already proven appropriate for this particular purpose, i.e. which is capable of withstanding such a harsh corrosive attack. As set out in the patent

specification, column 1, lines 44 to 49, in sour or acid environments "super-duplex"-stainless steels constitute the skilled person's first choice, as disclosed for instance in document EP-A-0594935 (EP93106675.7). This assessment of the prior art and the starting point derived therefrom was not challenged or commented upon by the respondent. In particular with respect to the chemical composition and microstructure, super-duplex-steels are, however, totally different from supermartensitic stainless steel.

5. *Inventive step*

5.1 In view of the principles referred to in the previous paragraphs, documents D1 and D2, which were considered as closest prior art in the decision under appeal, cannot be accorded that status in view of the patent as now amended, because the supermartensitic steel tubes and pipes disclosed in D1 and D2 were provided to be used only in "sweet" environments, i.e. in different corrosive media. Contrary to the respondent's position, there is nothing in documents D1 or D2 prompting the skilled reader to conclude that the use of structural parts produced from supermartensitic steels in highly aggressive "sour" media actually was envisaged.

5.2 The respondent argued that the steels in D1 or D2 already exhibit a resistance to SCC in "sweet" corrosive media comprising small amounts of H₂S. Therefore, the skilled man could have defined a higher anti-corrosion profile for these steels to resist the harsher attack in environments more "sour" than those specified in D1 or D2.

5.3 It is however not sufficient to determine whether or not the person skilled in the art could have modified the steel composition disclosed in D1 or D2 to include higher amounts of alloying element (eg. Cr and Mo) so that it was capable of withstanding and being used in the harsher "sour" conditions. Rather, it is important to determine whether the skilled person would be led by the objective problem to use the known supermartensitic steels for the claimed purpose, either by his own expert knowledge or by reason of other documents. Given that a pointer in this direction is not discernable in documents D1 and D2, no incentive can thus be gained from this technical teaching by the skilled person with regard to the achievement of the objective of the invention. On the contrary, the recognition, starting from document D1 (or D2), of such an objective would in itself be an element of a solution to whatever problem is made available by that disclosure. In other words, the subject matter of claim 1 was not obvious in the light of the prior art D1 and D2 and therefore involves an inventive step.

6. The dependent claims 2 to 6 refer to preferred embodiments of the use of the supermartensitic steel in accordance with the claims. They are, therefore, equally allowable.

7. *Procedural matter*

At the oral proceedings, the appellant withdrew its former written objections relating to possible procedural violations during the opposition proceedings, and its request for reimbursement of the appeal fee was

no longer maintained. Hence, there was no need to further deal with this issue.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form based on the following documents:

Claims: 1 to 6 and

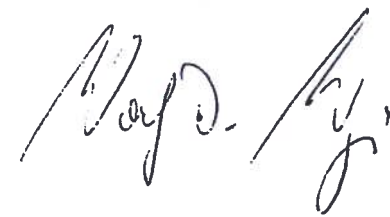
Description: columns 1 to 5

both submitted at the oral proceedings.

The Registrar:


V. Commare

The Chairman:


W. D. Weiß