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**Datasheet for the decision
of 31 March 2011**

Case Number: T 0645/09 - 3.2.08

Application Number: 02028526.8

Publication Number: 1431408

IPC: C22C 38/58

Language of the proceedings: EN

Title of invention:

Low nickel containing chromium-nickel-manganese-copper
austenitic stainless steel

Patentee:

Yieh United Steel Corp.

Opponent:

ThyssenKrupp Nirosta GmbH

Headword:

Relevant legal provisions:

EPC Art. 83, 123(3)

Relevant legal provisions (EPC 1973):

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Keyword:

"Invention - sufficiently clear and complete for it to be
carried out by a person skilled in the art (no) - main request,
1st and 2nd auxiliary requests"

"Extension of the subject-matter of claim 1 (yes) - 3rd
auxiliary request"

Decisions cited:

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Catchword:

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Case Number: T 0645/09 - 3.2.08

DECISION
of the Technical Board of Appeal 3.2.08
of 31 March 2011

Appellant: Yieh United Steel Corp.
(Patent Proprietor) 600, Shing Loong St.
Jia Hsing Li
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Respondent: ThyssenKrupp Nirosta GmbH
(Opponent) Oberschlesienstrasse 16
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Representative: Cohausz & Florack
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 19 January 2009
revoking European patent No. 1431408 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: T. Kriner
Members: R. Ries
A. Pignatelli

Summary of Facts and Submissions

I. By its decision dated 19 January 2009, the opposition division revoked European patent No. 1 431 408.

The opposition division held, amongst other things, that the European patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Articles 83 and 100(b) EPC).

II. The patent proprietor (appellant) lodged an appeal against the decision. The appeal was received at the European Patent Office on 19 March 2009 and the appeal fee was paid on the same date. The statement setting out the grounds of appeal was received on 29 May 2009.

III. Oral proceedings took place on 31 March 2011.

The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of

- the claims according to the main request or, alternatively,
 - according to one of the auxiliary requests 1 to 3,
- all filed with the statement setting out the grounds of appeal on 29 May 2009.

The respondent (opponent) requested that the appeal be dismissed.

IV. Independent claim 1 of the main request reads:

"An austenitic stainless steel having:

- (a) 0.03wt% to 0.12wt% of C;
- (b) 0.2wt% to 1.0wt% of Si;
- (c) 7.5wt% to 10.5wt% of Mn;
- (d) 14.0wt% to 16.0wt% of Cr;
- (e) 1.0wt% to 5.0wt% of Ni;
- (f) 0.04wt% to 0.25wt% of N;
- (g) 1.0wt% to 3.5wt% of Cu;
- (h) trace amount of Mo;

and

the balance being Fe and incidental impurities;
and optionally no more than 150 ppm of S, and/or no
more than 0.06 wt% of P,

wherein the austenitic stainless steel has been hot
rolled in a temperative range of 1050°C to 1250°C and
has a δ -ferrite content that is less than 8.5 and that
satisfies the following formula

$$\delta\text{-ferrite} = 6.77[(d)+(h)+1.5(b)] - 4.85 [(e)+30(a)+30(f)+0.5(c)+0.3(g)] - 52.75,$$

further characterized by the content of C, Si, Mn, Cr,
Ni, and Cu as following:

- (a) 0.036 wt% of C;
- (b) 0.56 wt% of Si;
- (c) 7.7 wt% of Mn;
- (d) 15.12 wt% of Cr;
- (e) 4.26 wt% of Ni;
- (g) 1.67 wt% of Cu;

the austenitic steel having elongation of 55.2 % and
hardness of 83.5 HRB0; or

- (a) 0.039 wt% of C;
- (b) 0.47 wt% of Si;
- (c) 7.97 wt% of Mn;

- (d) 15.32 wt% of Cr;
- (e) 4.21 wt% of Ni;
- (g) 1.66 wt% of Cu;

the austenitic steel having elongation of 55.3 % and hardness of 82.5 HRB0; or

- (a) 0.056 wt% of C;
- (b) 0.54 wt% of Si;
- (c) 7.69 wt% of Mn;
- (d) 15.26 wt% of Cr;
- (e) 4.21 wt% of Ni;
- (g) 1.79 wt% of Cu;

the austenitic steel having elongation of 55.0 % and hardness of 82.3 HRB0; or

- (a) 0.049 wt% of C;
- (b) 0.48 wt% of Si;
- (c) 7.7 wt% of Mn;
- (d) 15.26 wt% of Cr;
- (e) 4.15 wt% of Ni;
- (g) 1.66 wt% of Cu;

the austenitic steel having elongation of 53.1 % and hardness of 82.8 HRB0; or

- (a) 0.040 wt% of C;
- (b) 0.49 wt% of Si;
- (c) 7.93 wt% of Mn;
- (d) 15.35 wt% of Cr;
- (e) 4.20 wt% of Ni;
- (g) 1.67 wt% of Cu;

the austenitic steel having elongation of 53.7 % and hardness of 84.3 HRB0; or

- (a) 0.039 wt% of C;
- (b) 0.48 wt% of Si;
- (c) 7.96 wt% of Mn;
- (d) 15.29 wt% of Cr;
- (e) 4.21 wt% of Ni;

(g) 1.66 wt% of Cu;
the austenitic steel having elongation of 53.8 % and
hardness of 82.8 HRBO; or

- (a) 0.044 wt% of C;
- (b) 0.46 wt% of Si;
- (c) 7.93 wt% of Mn;
- (d) 15.01 wt% of Cr;
- (e) 4.22 wt% of Ni;
- (g) 1.70 wt% of Cu;

the austenitic steel having elongation of 54.1 % and
hardness of 83.9 HRBO; or

- (a) 0.055 wt% of C;
- (b) 0.52 wt% of Si;
- (c) 7.70 wt% of Mn;
- (d) 15.32 wt% of Cr;
- (e) 4.20 wt% of Ni;
- (g) 1.68 wt% of Cu;

the austenitic steel having elongation of 55.2 % and
hardness of 87.5 HRBO; or

- (a) 0.058 wt% of C;
- (b) 0.48 wt% of Si;
- (c) 7.56 wt% of Mn;
- (d) 15.27 wt% of Cr;
- (e) 4.41 wt% of Ni;
- (g) 1.80 wt% of Cu;

the austenitic steel having elongation of 53.4 % and
hardness of 83.4 HRBO."

In claim 1 of the first and second auxiliary requests
the term "HBRO" has been replaced by "HBR".

In claim 1 of the second and third auxiliary requests,
the term "wherein the austenitic stainless steel has
been hot rolled in a temperative range of 1050°C to
1250°C" has been deleted.

In claim 1 of the third auxiliary request the numerical values for the hardness and elongation have been deleted.

V. The appellant's arguments can be summarized as follows:

As regards the reproducibility of the nine individual alloy compositions set out in claim 1 of all requests, the person skilled in the art, using modern computerized process technology, was capable of adjusting a steel composition to the very narrow values of individual elements forming the steel alloy. When producing the steel, the skilled person extracted probes as often as necessary until the analysis provided the results aimed at. The same was true for the mechanical properties required for each steel composition. The precise values for the individual elements in the claimed alloy compositions were true results of working examples and not fictive ranges. A person skilled in the art was able to distinguish reliably between alloys falling within or without the scope of protection of the claims of all requests.

The requirements of Article 83 EPC were therefore met.

VI. The respondent's arguments can be summarized as follows:

In addition to the technical difficulty of producing a "point-like" steel composition, claim 1 further required that each steel exhibited precise values for the hardness and elongation. The mechanical properties of a steel, including hardness and elongation, were however strongly influenced by process parameters, such

as the hot rolling temperature, the amount of delta-ferrite and the nitrogen content, which were all unknown for the individual steel compositions featuring in claim 1. Hence the claimed steel alloy composition could not be put into practice by a person skilled in the art. Article 83 EPC was therefore not met.

Reasons for the Decision

1. The appeal is admissible.
2. In addition to the elemental ranges for the austenitic steel, claim 1 of all requests defines nine individual steel compositions which are based on the corresponding exemplifying alloys Nos. 13 to 19, 21 and 22 listed in Tables 3 and 4 of the patent specification. Apart from the point-like values for C, Si, Mn, Cr, Ni and Cu making up the individual composition, each alloy is further required to comprise nitrogen within the range of 0.04 to 0.25 wt%, a delta ferrite content of less than 8.5 as well as specific values for the hardness and elongation.
3. In order to satisfy Article 83 EPC, the disclosure of a patent must be reproducible without undue burden.

It is, however, almost impossible in steel technology to reproduce exactly an individual "point-like" steel composition comprising six components. Even if a certain deviation around the individual values for each component was tolerated, and taking into account the degree of accuracy of chemical analysis, it is highly unlikely, if not impossible, to reproduce in addition

to the exact steel composition a precise hardness in combination with a specific elongation (e.g. 83.5 HRB and 55.2% as required for example in the first point-like steel composition). This is all the more true since the individual compositions featuring in claim 1 of all requests do not define the specific nitrogen content and do not show the process parameters which were used in order to reach the exact hardness and elongation values required for each composition.

It is, however, clearly evident from the formula for calculating the amount of delta-ferrite featuring in claim 1 of all requests that nitrogen as a compulsory alloying element has a direct and strong influence on the formation of austenite and delta-ferrite and, in consequence thereof, of the final hardness and elongation. In addition, the ratio between the austenite and delta-ferrite phase in the microstructure is also determined by the hot rolling and cooling conditions. A person skilled in the art putting into practice the subject-matter of claim 1 is required to carry out a plethora of tests and experimental work in order to determine - for one single composition - the optimum nitrogen content in combination with the appropriate hot rolling temperature to produce an austenitic steel satisfying the composition, specific hardness and elongation values set out in claim 1.

Where, however, the skilled person can only establish by trial and error whether or not his particular choice of numerous parameters will provide a satisfactory result, this amounts to an undue burden. Given this situation, the requirement of Article 83 EPC is not met for the subject matter of claim 1 of all requests.

4. In claim 1 of the third auxiliary request the hardness and elongation values for the nine individual steel compositions are cancelled. Since claim 1 as granted defined an austenitic steel composition exhibiting a hardness and elongation within specific ranges, the omission of these values in claim 1 of the third auxiliary request contravenes Article 123(3) EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

V. Commare

T. Kriner