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D E C I S I O N
of 5 October 2005

Case Number: T 0342/03 - 3.2.07

Application Number: 98110006.8

Publication Number: 0882804

IPC: C21D 9/573

Language of the proceedings: EN

Title of invention:
Method for heat treating rolled stock and device to achieve the method

Applicant:
DANIELI & C. OFFICINE MECCANICHE S.p.A.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84, 123(2)

Keyword:
"Amendments - extension beyond the content of the application as filed (Main request - yes)"
"Claims - clarity (first and second auxiliary request - no)"

Decisions cited:
T 0194/84, T 0284/94

Catchword:
-

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Case Number: T 0342/03 - 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 5 October 2005

Appellant: DANIELI & C. OFFICINE MECCANICHE S.p.A.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 29 October 2002 refusing European application No. 98110006.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: H. Meinders
Members: H. E. Hahn
C. Holtz

Summary of Facts and Submissions

I. The applicant lodged an appeal against the decision of the Examining Division to refuse the European patent application No. 98 110 006.8.

The Examining Division held that claims 1 and 13 as filed on 29 May 1999 met the requirements of Article 123(2) EPC but that the subject-matter of these claims lacked an inventive step over document D2 (= US-A-2 756 169).

II. With a communication dated 4 July 2005 and annexed to the summons to oral proceedings the Board presented its preliminary opinion with respect to claims 1, 2 and 13 as filed together with the grounds of appeal on 28 February 2003. The subject-matter of the process claims 1 and 2 and of the device claim 13 was considered to lack inventive step over the disclosure of D2 and the common general knowledge of the skilled person.

III. In response to this communication the appellant filed with its letter of 30 August 2005 a new request comprising claims 1 to 10 and further arguments in order to support inventive step of the subject-matter claimed.

IV. Oral proceedings before the Board of Appeal were held on 5 October 2005.

The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 10 according to the main request as

submitted with letter of 30 August 2005, or alternatively on the basis of these claims, amended according to two subsidiary requests.

V. Independent claims 1, 2 and 10 of the main request read as follows:

"1. Method for heat treating a first and a second class of rolled stock (13) leaving a rolling train (12), wherein said first class of rolled stock (13) is subjected to a treatment of surface hardening, while said second class of rolled stock (13) is subjected to a controlled cooling in order not to obtain hardened structures, said method comprising a rapid cooling step for rapidly cooling said rolling stock (13) in a rapid cooling assembly (11) located immediately downstream of the last rolling pass to quickly reduce the temperature of the surface of said rolled stock (13), a temperature-equalisation step in air and at least a second cooling step before discharging and wound said rolled stock (13) into coils on a winding assembly (16), the method being characterised in that, for said first class of rolled stock (13),
- said rapid cooling step rapidly decreases the temperature of the surface of said rolled stock (13) below the point of martensitic transformation and causes the formation of a martensitic surface structure, a bainitic sub—surface structure and a pearlitic inner structure,
- said temperature—equalisation step in air is performed in a first segment (14) wherein the progressive propagation of the heat from the core to the periphery of the rolled stock (13) causes the

tempering of the martensitic structures obtained in the surface areas of the rolled stock (13),
- the tempering of said rolled stock (13) is stopped in said second cooling step so that the martensitic structures which have formed on the surface of the rolled stock (13) are not modified,
- said at least second cooling step is set so as not to modify the surface crystalline structure and the inner crystalline structure of the rolled stock (13) which have formed at the outlet of said rapid cooling treatment, to prevent the depth of the martensitic surface layer from increasing and to avoid the need of a further cooling step of said coils,
- said at least second cooling step is followed by a segment of temperature—equalisation in air, shorter than said first segment (14), so as to achieve the optimum winding temperature and
- said rolled stock (13) is then directly wound into coils on said winding assembly (16), whereby the slow cooling of the rolled stock (13) wound in compact form on said winding assembly (16) completes the tempering of the hardened outer crown, previously interrupted, in an optimum manner and leads to the transformation of the crystalline structure in the stable structures."

"2. Method for heat treating a first and a second class of rolled stock (13) leaving a rolling train (12), wherein said first class of rolled stock (13) is subjected to a treatment of surface hardening, while said second class of rolled stock (13) is subjected to a controlled cooling in order not to obtain hardened structures, said method comprising a rapid cooling step for rapidly cooling said rolling stock (13) in a rapid cooling assembly (11) located immediately downstream of

the last rolling pass to quickly reduce the temperature of the surface of said rolled stock (13), a temperature-equalisation step in air and at least a second cooling step before discharging and wound said rolled stock (13) into coils on a winding assembly (16), the method being characterised in that, for said second class of rolled stock (13),

- said rapid cooling step rapidly decreases the temperature of the surface of said rolled stock (13) above the point of martensitic transformation, so that the substantially homogeneous austenitic structure is not transformed;
- said temperature-equalisation step in air is performed in a first segment (14) wherein the equalisation of the temperature of the core and the surface of said rolled stock (13) occurs,
- said at least second cooling step is regulated, in terms of duration and intensity of cooling, in such a way that the surface temperature of the rolled stock (13) is not taken below the level at which bainite forms, whereby said at least second cooling step avoids the need of a further cooling step of said coils,
- said at least second cooling step is followed by a segment of temperature-equalisation in air, shorter than said first segment (14), so as to achieve the optimum winding temperature, and
- said rolled stock (13) is then directly wound into coils on said winding assembly (16), whereby the slow cooling of the rolled stock (13) wound in compact form on said winding assembly (16) leads to the transformation of the austenite in the stable structures."

"10. Device for heat treating a first and a second class of rolled stock (13) leaving a rolling train (12) having a last rolling pass, wherein said first class of rolled stock (13) is subjected to a treatment of surface hardening, while said second class of rolled stock (13) is subjected to a controlled cooling in order not to obtain hardened structures, said device being characterised in that it comprises a rapid cooling assembly (11) located immediately downstream of said last rolling pass and able both to cause in said first class of rolled stock (13) the formation of a martensitic surface structure, a bainitic sub-surface structure and a pearlitic inner structure and to cool said second class of rolled stock (13) at a speed above the critical speed and to take the surface temperature of said second class of rolled stock (13) to a value not less than the level at which martensite forms, in that said rapid cooling assembly (11) is followed by a first segment (14) of temperature-equalisation in air, which is followed by one to four cooling stages (15a, 15b, 15c), in that each of said cooling stages (15a, 15b, 15c) is set in such a way as not to modify the crystalline surface structure which has formed at the outlet of said rapid cooling assembly (11) which remains mostly unchanged, in that each of said cooling stages (15a, 15b, 15c) is followed by a corresponding segment of temperature-equalisation in air shorter than said first segment (14), and in that a winding assembly (16) is provided immediately downstream said cooling stages (15a, 15b, 15c) for the direct winding of the rolled stock (13) into coils of compact spirals".

VI. The first auxiliary request comprises
- claim 1, lines 9 to 12 reading "followed by a brief segment of temperature—equalisation in air, so as to achieve the optimum winding temperature and"
- claim 2, lines 26 to 28 reading: "followed by a brief segment of temperature—equalisation in air, so as to achieve the optimum winding temperature and"
- claim 10, lines 18 to 20 reading: "(15a, 15b, 15c) is followed by a brief segment of temperature-equalisation in air, and in that a winding assembly".

VII. The second auxiliary request comprises
- claim 1 amended as per first auxiliary request, the last part now reading: "so as to achieve a winding temperature of between 420°C and 570°C and"
- claim 2 as amended per the first auxiliary request, the last part now reading: "so as to achieve a winding temperature of between 650°C and 750°C and".

VIII. The appellant argued essentially as follows:

The claimed feature "followed by a (corresponding) segment of temperature-equalisation in air shorter than said first segment (14)" can be derived from figure 1 of the specification as originally filed which clearly shows that the distance of the first segment (14) is shorter than those of the segments following the intermediate cooling stages (15a, 15b, 15c). Another basis for this amendment can be found at e.g. page 7, line 18 or page 12, lines 7 to 22 of the application as originally filed where "a brief segment of temperature-equalisation in air" is mentioned; or at page 14, lines 10 to 21 where "short temperature-equalisation segments" or "short equalisation segments" are

mentioned. The different distances allow to cool down the rolled stock faster and thus to avoid the overtempering during the winding of the stock at a preset temperature without changing the previously formed structure. Therefore this amendment meets the requirements of Article 123(2) EPC.

A basis for the amendment "a brief segment" according to the auxiliary requests can be found at e.g. page 7, line 18; page 12, lines 7 to 22; and page 14, lines 10 to 21 of the application as originally filed. From figures 2 and 3 it can be derived that the terms "short" or "brief" mean a length of about 20 meters. The description does not give a more precise definition of the relative distances but the resulting effect is described in more detail. The generalisation to "at least one second cooling step" - which implies "at least one brief segment of temperature equalisation in air" following the second cooling step is supported by the disclosure at page 7, lines 18 to 20; page 7, line 31 to page 8, line 1; and page 12, lines 7 to 22 of the application as originally filed, so that the requirements of Article 123(2) EPC should be met.

Reasons for the Decision

1. *Allowability of amendments (Article 123(2) EPC)*

1.1 Claims 1 and 2 of the main request comprise the identical feature "followed by **a segment** of temperature-equalisation in air **shorter than said first segment (14)**" while claim 10 of the main request comprises the feature "followed by **a corresponding**

segment of temperature-equalisation in air **shorter than said first segment (14)**".

1.2 This amendment is not the subject of any original claim nor is it disclosed as isolated feature in those parts of the description which provide a general discussion of the aspects or merits of the invention.

The description and also claims 1, 3, 8 and 12 of the present application as originally filed mention explicitly only that the further cooling stages (15a, 15b, 15c) are either "followed by a short segment of temperature-equalisation in air" (see claim 1) or "followed by a brief segment of temperature-equalisation in air", however, not in a sense comparative to the first mentioned temperature-equalisation step.

1.3 The only specific embodiment of an "end part of a rolling line using the invention" is shown "in diagram form" in figure 1 of the application as originally filed (compare page 10, lines 20 to 24). Figure 1 discloses between the rapid cooling assembly (11) and the first intermediate cooling stage (15a) a first segment (14) of temperature-equalisation in air. This first cooling stage (15a) is stated to be "at a defined distance" which, however, is nowhere defined (see page 11, line 32 to page 12, line 1).

Between the intermediate cooling stages (15a), (15b) and (15c) and between the last intermediate cooling stage (15c) and the winding assembly (16) the aforementioned further "brief segments of temperature-equalisation in air" or "short segments of temperature-

equalisation in air" are schematically shown, respectively (see also page 7, lines 18 to 20; page 12, lines 7 to 17; page 14, lines 10 to 21).

Although the length of these "brief" segments shown in figure 1 may be considered smaller than the length of the first segment (14) there exists no basis for the generalisation that these segments have to be "shorter" than the first segment (14), particularly when considering the meaning of this relative term "shorter". Such a "shorter" segment may be 1 mm, 1 cm, 1 m or more than 10 m shorter than the first segment (14).

However, the description of the application and particularly for said figure 1 does not support such a range for the difference in distances starting at e.g. 1 mm.

1.4 Figures 2 and 3 disclose temperature/distance graphs of materials subjected to the heat treatment according to the invention. From the distance values given in the horizontal axes of these graphs it can only be derived that the first segment (14) of the specific embodiment is longer than the subsequent two "brief" (or "short") segments, and that these two latter segments seem to have the same length (also according to the schematic figure 1). The length of the last segment between the last intermediate cooling stage (15c) and the winding assembly appears to be longer than the preceding "brief" (or "short") segment. Consequently, figures 2 and 3 do not support said generalisation "shorter than" in the sense of the possible range as discussed in paragraph 1.3 above.

Therefore, in the Board's view, the amendment "shorter than ..." cannot be directly and unambiguously deduced from the application documents as originally filed.

1.5 The description is also silent with respect to the fact that this feature - as stated by the applicant - represents an essential feature of the invention. Although it is clear to the skilled person that the heat treated stock according to the invention shall be wound into a roll or coil within a certain temperature range in order to take account of the desired structure of the specific material treated, it is not clear to the skilled person that the temperature-equalisation steps in air following the intermediate cooling stages have to be shorter in order to avoid the overtempering of the wound roll or coil.

The applicant's arguments in this respect cannot be accepted since also the devices and processes of the prior art having equal lengths of the temperature-equalisation segments (such as the one according to document D2) allow to achieve the winding of the roll or coil within a preset temperature range which is selected on the basis of the material to be heat treated. Thus for both cases the overtempering of the wound roll or coil can be avoided.

1.6 From said schematic drawing according to figure 1 it could also be deduced that the length of the three intermediate cooling stages (15a, 15b, 15c) decreases in the winding direction of the rolled stock (see figure 1; compare also page 12, line 30 to page 13, line 9). This feature of this single specific embodiment, however, has not been incorporated into

either the subject-matter of claims 1, 2 and 10 of the main request. The feature in question ("shorter than ...") - even if it would have a basis in the originally filed documents - is thus taken in isolation from the specific embodiment of figure 1.

1.7 With respect to the generalisation of an originally disclosed feature it is established case law (see Case Law of the Boards of Appeal of the European Patent Office, 4th edition, 2002, sections III.A.1 and III.A.3, see e.g. decisions T 284/94, OJ EPO 1999, 464; and decision T 194/84, OJ EPO 1990, 59) that replacing a disclosed specific feature in a claim by an undisclosed more general expression is not allowable under Article 123(2) EPC, since the introduction of such a general feature for the first time implicitly incorporates further features in the subject-matter of the application, so that combined with the disclosed features novel subject-matter would be created as compared with the application as originally filed.

1.8 For these reasons already - without considering the further amendments made to the three independent claims - the Board finds that claims 1, 2 and 10 of the main request are amended in such a way that they contain subject-matter which extends beyond the content of the application as filed. They thus do not comply with the requirement of Article 123(2) EPC. Consequently, the main request is not allowable.

2. *Clarity (Article 84 EPC)*

2.1 Claims 1, 2 and 10 of the first auxiliary request differ from the main request in that the objected

feature "followed by **a (corresponding) segment** of temperature-equalisation in air **shorter than said first segment (14)**" was replaced by the feature "followed by a **brief** segment of temperature—equalisation in air".

2.2 Article 84 EPC requires that the claims must be clear since the clarity of the claims is of the utmost importance in view of their function in defining the matter for which protection is sought. Therefore, the meaning of the terms of a claim should be clear for the skilled person from the wording of the claim alone.

2.3 The relative term "**brief**" (which is used as a synonym for "short"; see claims 1, 3, 8 and 12 of the application as originally filed) in the feature "a brief segment" has no exact and precise meaning in the art. Consequently, this term does not allow a precise definition of the subject-matter claimed and thereby renders claims 1, 2 and 10 of the first auxiliary request unclear.

The mere fact that a more precise meaning of this term can be derived from figures 2 and 3 of the present application (a brief segment with a length of "about 20 m" as argued by the appellant) does not lead to the claims meeting the clarity requirement either.

Claims 1, 2 and 10 of the first auxiliary request therefore do not meet the requirement of Article 84 EPC. Consequently, the first auxiliary request is not allowable.

2.4 Claims 1, 2 and 10 of the second auxiliary request comprise the identical feature "**brief segment** of

temperature-equalisation in air" as claims 1, 2 and 10 of the first auxiliary request so that the conclusions of points 2.2 to 2.3 above apply *mutatis mutandis*.

Consequently, the second auxiliary request is also not allowable under Article 84 EPC.

2.5 Under these circumstances the Board has to dismiss the appeal.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Nachtigall H. Meinders