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**Datasheet for the decision
of 29 January 2021**

Case Number: T 0955/18 - 3.2.03

Application Number: 08710745.4

Publication Number: 2111933

IPC: B21B25/00, C23C8/14

Language of the proceedings: EN

Title of invention:

PROCESS FOR PRODUCING PLUG FOR USE IN PIERCING/ROLLING RAW METALLIC MATERIAL, PROCESS FOR PRODUCING METALLIC TUBE, AND PLUG FOR USE IN PIERCING/ROLLING RAW METALLIC MATERIAL

Patent Proprietor:

Nippon Steel & Sumitomo Metal Corporation

Opponent:

SMS group GmbH

Headword:

Relevant legal provisions:

EPC Art. 123(2), 54(1), 56
RPBA Art. 12(4)

Keyword:

Amendments - extension beyond the content of the application
as filed (no)

Novelty - (yes)

Inventive step - (yes)

Late-filed facts - could have been filed in first instance
proceedings (yes)

Decisions cited:

T 0666/89, T 0026/85

Catchword:



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Case Number: T 0955/18 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 29 January 2021

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Decision under appeal: **Decision of the opposition division of the European Patent Office posted on 12 February 2018 rejecting the opposition filed against European patent No. 2111933 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman C. Herberhold
Members: G. Patton
N. Obrovski

Summary of Facts and Submissions

- I. The opponent lodged an appeal in the prescribed form and within the prescribed period against the decision of the opposition division rejecting the opposition against European patent No. 2 111 933.
- II. The opposition was directed against the patent as a whole and was based on Article 100(a) EPC (lack of novelty and inventive step) and Article 100(c) EPC (unallowable amendments).
- III. In a communication pursuant to Article 15(1) RPBA 2020 dated 28 May 2020 the board provided its preliminary, non-binding opinion that the appeal was likely to be dismissed.

Oral proceedings were held on 29 January 2021. For matters that arose during the oral proceedings, in particular the issues discussed with the parties and their requests, reference is made to the minutes.

The order of the present decision was announced at the end of the oral proceedings.

- IV. The opponent (hereafter the "appellant") requested
- that the decision be set aside and
that European patent No. 2 111 933 be revoked.

The patent proprietor (hereafter the "respondent") requested

that the appeal be dismissed, i.e. the patent be maintained as granted (main request), or subsidiarily

that the patent be maintained in amended form on the basis of one of auxiliary requests 1 to 4, filed with the letter dated 11 September 2018.

V. The following documents of the opposition proceedings are relevant to the present decision:

D1: EP 1 632 583 A;
D3: JP 2003-103301 A;
D5: JP S 63-69948 A;
D6: JP H 10-291008 A;
D7: JP S 60-86262 A;
D8: JP H 4-270003 A; and
D9: JP 2002-273505 A.

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

"A method of manufacturing a plug used to pierce and roll a metal material, comprising the steps of:

preparing a plug material (100); and
manufacturing a plug including an oxide scale layer (30) having an inner scale layer (10) formed on the surface of the plug material and an outer scale layer (20) formed on said inner scale layer by thermally treating said prepared plug material in a heat treatment atmosphere that contains at least 2.0 vol.% oxygen at a heat treatment temperature from 950°C to 1000°C for 6 to 25 hours and, after the thermal

treatment, cooling said prepared plug material at a cooling rate of 25 to 150°C per hour."

Claim 4 of the **main request** (patent as granted) reads as follows:

"A plug used to pierce and roll a metal material, comprising:

a base material (100); and
an oxide scale layer (30) formed on the surface of said base material, the oxide scale layer (30) being producible by heat treatment in a heat treatment atmosphere that contains at least 2.0 vol.% oxygen at a heat treatment temperature from 950°C to 1000°C for 6 to 25 hours and, after the thermal treatment, cooling said base material at a cooling rate of 25 to 150°C per hour, wherein the oxide scale layer includes:

an inner scale layer formed on the surface of the base material and
an outer scale layer formed on said inner scale layer."

In view of the outcome for the main request, the wording of the independent claim(s) of **auxiliary requests 1 to 4** plays no part in the present decision.

In the following, reference will therefore only be made to the main request.

VII. The appellant essentially argued as follows (the arguments are discussed in more detail in the Reasons for the Decision below):

Added subject-matter

The following features (a) and (b) added to claims 1 and 4 result in an unallowable intermediate generalisation, since they had originally been disclosed in just one embodiment in combination with other parameters not present in claim 1:

- (a) thermally treating for 6 to 25 hours and,
- (b) after the thermal treatment, cooling said prepared plug material at a cooling rate of 25 to 150°C per hour

In particular, the claimed limit of 2.0 vol.% oxygen was based only on original claim 2 and the passage of the original description, page 7, line 32 to page 8, line 11, which did not form part of that embodiment; so the subject-matter of claims 1 and 4 cherry picked from the original disclosure.

Novelty

The ranges in claim 1 relating to the process parameters overlapped, broadly in some cases, with the corresponding ones disclosed in D6. The skilled person would think of performing trials over the entire disclosed ranges and, by doing so, would immediately arrive at values within the ranges of overlap. In particular given the middle values of the disclosed ranges, they would seriously contemplate working within the ranges of overlap. The subject-matter of claim 1 should thus be considered as lacking novelty over the disclosure of D6. The same applied to claim 4.

Inventive step

The subject-matter of claim 1 lacked inventive step in view of the disclosure of D6 alone. Starting from D6, the skilled person faced with the problem of further improving the quality of the plug for manufacture of the metal pipe would immediately think of performing trials within the ranges of process parameters disclosed in D6 itself. In doing so, they would arrive at values within the ranges of overlap in an obvious manner. The same applied to claim 4.

D1 disclosed a method of manufacturing a plug in which the thermal treatment was performed at a temperature between 800 and 1,200°C at 2 vol.% oxygen content. In several embodiments of D1, the duration of the thermal treatment was between 6 and 8 hours. As far as the cooling rate was concerned, the skilled person was aware of its influence on the surface properties of the plug and would consult the appropriate prior art, in particular D6.

D5 disclosed a method of manufacturing a plug in which the thermal treatment was performed at between 850 and 1,100°C in an oxidising atmosphere and cooled to 450°C at a rate of not more than 30°C/hour. This disclosure was linked to obtaining a scale with a thickness that improved the plug life.

D7 disclosed a thermal treatment performed with an oxygen content of between 0.5 and 5 vol.%, rendering the claimed range obvious. In the thermal treatment of D7 the temperature was set at 1,000°C or less, e.g. 850°C or 950°C, in order to make the scale bite into the base metal and to secure the thickness of the oxide layer.

Hence, starting from D6 the skilled person using the teaching of one of documents D1, D5 or D7 would arrive at the subject-matter of claim 1 in an obvious manner.

The objection of a lack of inventive step starting from D1 in combination with D6 should be admitted into the appeal proceedings, since these documents had been in the file since the beginning of the opposition proceedings.

- VIII. The respondent essentially argued as follows (the arguments are discussed in more detail in the Reasons for the Decision below):

Added subject-matter

Features (a) and (b) were not disclosed in the application as originally filed as being inextricably linked with other parameters. Thus, their insertion in claims 1 and 4 did not contravene Article 123(2) EPC.

Novelty

Although the ranges in claim 1 overlapped those disclosed in D6 there was no hint that would prompt the skilled person to seriously contemplate working within all the ranges of overlap at the same time. On the contrary, the embodiment of D6 taught the skilled person to work with a lower oxygen volume content and shorter thermal treatment than that claimed. The subject-matter of claim 1 should be considered as novel over the disclosure of D6. The same applied to claim 4.

Inventive step

The following features of claim 1 were distinguishing features over the embodiment of D6, paragraphs 68 and 69, taken as the closest prior art:

- a heat treatment atmosphere that contains at least 2.0 vol.% oxygen; and
- a heat treatment for 6 to 25 hours.

In view of the associated technical effects of improving the properties of the scale layer of the plug, the problem to be solved could be seen as providing an easier and cheaper method of manufacturing a plug.

The disclosure of D6 provided no hint of the distinguishing features in order to solve the objective technical problem. Hence, the skilled person would not arrive at the subject-matter of claim 1 in an obvious manner on the basis of the teaching of D6 alone. The same applied to claim 4.

D1 was not concerned with the concept of providing an outer scale layer which could be peeled off more easily. Therefore, the skilled person would have no reason to consider and combine the teaching of D1 with that of the closest prior art D6.

D5 did not teach considering the oxide scales as separate inner and outer scale layers at all, but only focused on increasing the adhesion of oxide scales. Thus, nothing in D5 would be considered by the skilled person who was trying to solve the technical problem mentioned above starting from D6.

It was unclear why the skilled person would consider an oxygen content of 2.0 vol.% or more on the basis of D7. Hence, the skilled person would not arrive at the subject-matter of claim 1 in an obvious manner when combining the teaching of D7 with that of D6.

There was no justification for raising the objection of lack of inventive step starting from D1 in combination with D6 for the first time in the appeal proceedings. Hence, it should not be admitted into the proceedings.

Reasons for the Decision

1. *Added subject-matter*

1.1 The appellant argues that the following features which have been added to claims 1 and 4:

(a) thermally treating for 6 to 25 hours and,

(b) after the thermal treatment, cooling said prepared plug material at a cooling rate of 25 to 150°C per hour

are taken from just one embodiment of the description as originally filed, see page 7, lines 9-12, which would further require that:

(i) the plug material is a tool steel, a Fe-Cr alloy steel, a Fe-C alloy steel (page 7, lines 14-19 of the description as originally filed);

(ii) the heat treatment atmospheres contains 10 vol.% CO₂ and 10 vol.% H₂O, and the balance

consisting of N₂ and impurities (page 7, line 32 to page 8, line 11 of the description as originally filed); and

- (iii) the thickness of the oxide scale layer reaches a thickness from 200 µm to 1000 µm (page 10, line 29 to page 11, line 1 of the description as originally filed).

Hence, the appellant considers that since features (i), (ii) and (iii) are not included in claims 1 and 4, the addition of just features (a) and (b) to these claims amounts to an unallowable intermediate generalisation.

- 1.2 The board does not share this view for the following reasons given by the respondent.

The passages referred to by the appellant for features (i) and (iii) read as follows (emphasis added by the board):

- (i') The plug material **may be for example** a tool steel. It **may be** a Fe-Cr alloy steel, a Fe-C alloy steel **or the like** (page 7, lines 18-19 of the description as originally filed); and
- (iii') the thickness of the oxide scale layer reaches **a preferable thickness** from 200 µm to 1000 µm (page 10, lines 32-33 of the description as originally filed).

Consequently, features (i) and (iii) are unambiguously originally disclosed as preferable, i.e. not mandatory.

With respect to feature (ii), reference is made to page 9, lines 14-16 of the description as originally filed which states (emphasis added by the board):

(ii') **For example**, the heat treatment atmosphere contains 5 vol.% to 15 vol.% CO₂ and 5 vol.% to 25 vol.% H₂O, and the balance consists of N₂ and impurities.

This passage makes it clear that the content of these elements in the atmosphere is given merely as an example, i.e. is not mandatory. Only the claimed content of O₂ is required, see page 7, lines 32-33 of the description as originally filed.

Contrary to the appellant's view, the same atmosphere used for each example in accordance with page 8, lines 6-8 of the description as originally filed (feature (ii) above) is not contradicted by the disclosure of these broad ranges (features (ii')), since it falls completely within them.

Consequently, the isolated features (a) and (b) are not inextricably linked with features (i), (ii) and (iii) or any other features of the embodiment(s) originally disclosed.

1.3 As argued at the oral proceedings before the board, the appellant further considers that the skilled person would derive from the original description taken as a whole, and more particularly from this one embodiment that the invention concerns a method with the originally claimed limit of 1.0 vol.% oxygen. The limit of 2.0 vol.% oxygen inserted in claim 1 of the main request would only be based on original claim 2 and the passage of the original description, page 7, line 32 to

page 8, line 11, not part of this embodiment. For the appellant, claims 1 and 4 as granted result from cherry-picking features from different passages of the original disclosure, contrary to the requirements of Article 123(2) EPC.

1.4 The board does not share this view since, as put forward by the respondent, the claimed limit of 2.0 vol.% oxygen is disclosed in original claim 2 independently of any of the parameters discussed under point 1.1 above (see also original claim 8). In this respect, claim 1 of the main request corresponds to the combination of features of original claims 1, 2 and 4 to which features (a) and (b) have been added (see also original claims 7, 8 and 9 for claim 4). As already discussed under point 1.2 above, the isolation of features (a) and (b) from the embodiment of the original description and their addition to these originally disclosed combinations of features does not represent an unallowable intermediate generalisation.

1.5 As a result, the board sees no reason to disagree with the finding in point II.2 of the impugned decision.

2. *Novelty*

The appellant disputes that the subject-matter of claims 1 and 4 of the main request is novel over the disclosure of D6.

2.1 Document D6, paragraphs 48, 49 and 51, discloses a method of manufacturing a plug used to pierce and roll a metal material, comprising the steps of:
preparing a plug material; and
manufacturing a plug including an oxide scale layer having an inner scale layer formed on the surface of

the plug material and an outer scale layer formed on said inner scale layer by thermally treating said prepared plug material in a heat treatment atmosphere that contains 5% or less oxygen at a heat treatment temperature from 900 to 1,200°C for 1 to 10 hours and, after the thermal treatment, cooling said prepared plug material at a cooling rate of 100°C per hour or less.

2.2 As a result, the claimed and disclosed ranges of the process parameters overlap.

However, D6 does not give any reason why the skilled person **would seriously contemplate** applying the technical teaching of D6 in the ranges of overlap (T 666/89, OJ EPO 1993, 495 and T 26/85, OJ EPO 1990, 22).

The embodiment of D6, paragraphs 68 and 69, discloses a thermal treatment in an atmosphere that contains **1% oxygen** at a temperature from 950°C for **5 hours** and, after the thermal treatment, cooling at a cooling rate of 50°C per hour. Hence, the embodiment of D6 hints at an oxygen content and a duration of the thermal treatment outside the respective claimed ranges.

Therefore, the subject-matter of claim 1 of the main request is novel over D6.

2.3 The appellant argues that the claimed ranges relating to the oxygen volume content, the thermal treatment temperature and the cooling rate broadly overlap the ones disclosed in D6. Only the range of overlap between the disclosed and claimed ranges for the duration of the thermal treatment could be seen as narrower than the other ranges of overlap.

Furthermore, still according to the appellant, the skilled person would think of performing trials over the entire disclosed ranges and, by doing so, would immediately arrive at values within the ranges of overlap. In particular, when performing such trials the skilled person would first consider the middle values of the disclosed ranges (3% vol.% O₂, 1,050°C, 5 hours and 50°C/hour), which are either within or very close to the claimed ranges. With respect to the duration of the thermal treatment, the skilled person would have no reason to shorten it and so would think of allowing more time.

For the above reasons, the appellant considers that the skilled person would seriously contemplate working within the ranges of overlap, so the subject-matter of claim 1 should not be considered novel.

The same arguments would apply in relation to claim 4.

2.4 The board does not share the appellant's view for the following reasons, which were also invoked by the respondent.

As already mentioned under point 2.2 above, the board agrees with the appellant that the claimed and disclosed ranges of the process parameters overlap, possibly broadly in some cases.

However, there is no hint in D6, nor any evidence on file, of the common general knowledge of a skilled person that would prompt them to seriously contemplate working within all the ranges of overlap **at the same time**. The fact that the ranges overlap does not change this fact. On the contrary, in view of the embodiment of D6, the skilled person would contemplate working

with a lower oxygen volume content and shorter thermal treatment than that claimed. Nor does D6 teach that process parameters are to be set at the middle values of the disclosed ranges.

In the absence of any further specific arguments with respect to claim 4, the board considers that the above reasoning and conclusion apply *mutatis mutandis* to the subject-matter of claim 4 (see also point 3.9.2 below).

2.5 As a result of the above, the board sees no reason to disagree with the finding in point II.3 of the impugned decision.

3. *Inventive step*

The appellant contests that the subject-matter of claim 1 of the main request involves an inventive step in view of:

- the disclosure of D6 alone;
- the combination of the teaching of D6 with that of D1, D3, D5, D7, D8 or D9; and
- starting from D1 in combination with the teaching of D6.

At the oral proceedings before the board, the appellant chose to present arguments only in respect of the objection based on D6 alone and the admissibility of the late-filed objection starting from D1 in combination with D6. The reasons below in respect of the combination of the teaching of D6 with that of D1, D3, D5, D7, D8 or D9 were provided to the parties as the board's preliminary opinion with the communication dated 28 May 2020. This preliminary opinion has not been subsequently commented on or contested by the parties, either in writing or orally at the oral

proceedings. Therefore, after reviewing the parties' arguments, the board saw no reason to change its preliminary opinion.

3.1 Closest prior art

Given that D6, paragraph 1, concerns the manufacture of a plug used to pierce and roll metal material, as does claim 1, the board agrees with the parties that D6 represents an appropriate starting point for the assessment of inventive step.

3.2 Distinguishing feature(s)

Taking into account the discussion of the disclosure of D6 under points 2.1 and 2.2 above, the following features of claim 1 can be regarded as distinguishing features with respect to the embodiment of D6, paragraphs 68 and 69, which is taken as the closest prior art:

- a heat treatment atmosphere that contains **at least 2.0 vol.% oxygen**; and
- a heat treatment **for 6 to 25** hours.

3.3 Technical effect(s) - Problem to be solved

3.3.1 The above-mentioned distinguishing features make it easier to peel off the outer scale layer and increase the wear resistance of the inner scale (see paragraphs 55 and 56, Figures 3 and 5 of the contested patent).

Starting from D6 as the closest prior art, the objective technical problem to be solved can then be seen as improving the properties of the scale layer of the plug.

3.3.2 For the respondent, taking into consideration the easier peeling of the outer scale, the problem to be solved could also be formulated as providing an easier and cheaper method of manufacturing a plug (contested patent, paragraphs 6 and 9). Although this formulation of the problem could also be regarded as appropriate, for the following discussion the board remains with the wording of the objective technical problem specified under point 3.3.1 above, since it has also been acknowledged by the appellant.

3.4 In view of D6 alone

3.4.1 According to the appellant, D6, paragraph 49, deals with the same problem as in the contested patent, of making it easier to peel off the outer layer of the plug. The skilled person faced with the constant problem of further improving the quality of the plug, in particular the properties of its scale layer, for the manufacture of the metal pipe would immediately think of performing trials within the ranges of process parameters disclosed in D6. The disclosed ranges in themselves represent a hint to the skilled person of where to find a solution. In doing so, and optimising the process parameters in order to solve this problem, they would arrive at values within the ranges of overlap in an obvious manner.

3.4.2 The board does not share the appellant's view.

The appellant's objection is based on the general disclosure of D6, paragraph 51, taken as the closest prior art. However, the appellant fails to identify the distinguishing feature(s) on this basis. Hence, the appellant's arguments amount to stating that the

skilled person **could** have modified the general disclosure of D6 in such a way as to arrive at the claimed subject-matter. No reason is provided as to why they **would** have done so.

Starting from the specific embodiment of D6 as the closest prior art, as discussed under point 3.2 above, the disclosure of D6 provides not hint of increasing the duration of the thermal treatment and the oxygen volume content **at the same time** in order to solve the objective technical problem, as also admitted by the appellant at the oral proceedings. Nor is there any evidence on file of the skilled person's common general knowledge for doing so. In fact, D6 provides no teaching that points towards the combination of the two distinguishing features in order to solve the objective technical problem.

As a consequence, the lack of inventive step objection raised by the appellant on the basis of D6 alone is not convincing.

3.5 In combination with the teaching of D1

As put forward by the respondent, D1 is not concerned with providing an outer scale layer which can be peeled off more easily. Therefore, the skilled person faced with the above objective technical problem would have no reason to consider and combine the teaching of D1 with that of the closest prior art D6.

Hence, the board considers that the skilled person would not turn to D1 in expectation of finding the solution.

3.6 In combination with the teaching of D5 or D7

First, documents D5 and D7 do not deal with the above objective technical problem, so the board is not convinced that the skilled person faced with it would consider and combine their teaching with that of D6. Secondly, neither D5 nor D7 discloses the two distinguishing features, so a combination of their teachings with that of D6 would not enable the skilled person to arrive at the claimed subject-matter in an obvious manner.

3.7 In combination with the teaching of D3, D8 or D9

The lack of inventive step objections regarding the teachings of D3, D8 or D9 were not substantiated, neither in the statement setting out the grounds, nor at a later stage in the appeal proceedings. Hence, such unsubstantiated objections do not need to be discussed in the present decision.

3.8 Starting from D1

The respondent disputes the admissibility into the appeal proceedings of a lack of inventive step objection starting from D1 as the closest prior art in combination with the teaching of D6.

3.8.1 While conceding, at the oral proceedings before the board, that the objection in question had not been raised in the opposition proceedings, the appellant argues that the disclosure of D1 and D6 could not come as a surprise to the respondent, since they have been on file since the very beginning of the opposition proceedings. Hence, an objection on the basis of their

disclosure should be admitted into the appeal proceedings.

- 3.8.2 The board does not share the appellant's view for the following reasons, which were discussed at the oral proceedings.

The impugned decision, page 6, fifth paragraph to page 7, second paragraph, indicates that in the opposition proceedings the appellant raised objections on the basis of D1 as the closest prior art in combination with the teaching of either D3 or D5. As a consequence, the board considers that the appellant not only could but should have filed the objection in question in the opposition proceedings. The main request corresponds to the then main request underlying the impugned decision (patent as granted), so there is no justification for first filing the objection with the statement setting out the grounds of appeal.

Consequently, the objection is not admitted into the appeal proceedings, pursuant to Article 12(4) RPBA 2007.

- 3.9 Claim 4

- 3.9.1 The appellant disputes that the subject-matter of claim 4 involves an inventive step in view of the disclosure of D6 alone for the same reasons as those provided under point 3.4.1 above in relation to claim 1.

- 3.9.2 The board does not share this view, for the same reasons as those provided under point 3.4.2 above for claim 1. The thermal treatment enables the manufactured plug of claim 4 to have structural features, e.g. pores in the outer layer, see for instance paragraphs 5, 48

to 56, claim 5 and Figures 2, 6 and 7. This has not been contested by the appellant.

3.10 As a result of the above, the board agrees with the findings in the impugned decision point II.4.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Spira

C. Herberhold

Decision electronically authenticated