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**Datasheet for the decision
of 28 October 2014**

Case Number: T 2449/12 - 3.2.08

Application Number: 99105071.7

Publication Number: 0947597

IPC: C22C38/02, C21D8/12

Language of the proceedings: EN

Title of invention:

Method of producing a grain-oriented electrical steel sheet
excellent in magnetic characteristics

Patent Proprietor:

Nippon Steel & Sumitomo Metal Corporation

Opponent:

ThyssenKrupp Electrical Steel GmbH

Headword:

Relevant legal provisions:

EPC Art. 100(a), 56, 114
RPBA Art. 12(2)

Keyword:

Fresh ground of opposition (not admitted)
Late-filed documents (admitted)
Inventive step - (yes)

Decisions cited:

G 0009/91

Catchword:

When neither the merit nor the admittance of a ground of opposition which was late-raised and withdrawn during the opposition proceedings have been addressed in the decision under appeal, this ground is considered a fresh ground of opposition which cannot be introduced into the appeal proceedings without the consent of the patent proprietor.

The fact that the opposition division did not raise this ground of opposition of its own motion does not imply that it took a decision - subject to review of the board of appeal - to disregard it, as it might have been the case if this late-filed ground had been maintained (see point 2 of the Reasons).



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Case Number: T 2449/12 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 28 October 2014

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
4 October 2012 concerning maintenance of the
European Patent No. 0947597 in amended form.**

Composition of the Board:

Chairman T. Kriner
Members: M. Alvazzi Delfrate
D. T. Keeling

Summary of Facts and Submissions

- I. By its decision posted on 4 October 2012 the opposition division found that European patent No. 0 947 597, in amended form according to auxiliary request 1 then on file, and the invention to which it related met the requirements of the EPC.

In its decision the opposition division held that the claimed invention was sufficiently disclosed (Article 100(b) EPC) and that the subject-matter of both the independent claims of auxiliary request 1 involved an inventive step (Article 100(a) EPC).

The ground of opposition under Article 100(c) EPC, which was raised for the first time at the oral proceedings before the opposition division, was withdrawn at the same oral proceedings.

- II. The appellant (opponent) lodged an appeal against that decision in the prescribed form and within the prescribed time limit.
- III. Oral proceedings before the Board of Appeal were held on 28 October 2014.
- IV. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of the claims of Auxiliary Request 1, 2 or 3, all filed with letter dated 19 June 2013.

V. Claims 1 and 2 as maintained by the opposition division (present **main request**) read as follows:

"1. A method for producing a grain-oriented electrical steel sheet comprising the steps of reheating to a temperature in the range of 1260°C to 1350°C a slab comprising, by weight%, 0.025~0.10% of C, 2.5~4.0% of Si, 0.010~0.035% of acid-soluble Al, 0.0030~0.010% of N, $S_{eq}=(S+0.406 Se)$ of 0.008~0.05%, 0.02~0.2% of Mn, 0.02~0.30% Cr, optionally at least one selected from 0.02~0.30% of at least one of Sn, Sb and P, 0.01~0.30% of Cu, 0.03~0.30% of Ni and 0.008~0.3% of at least one of Mo and Cd and the balance being Fe and unavoidable impurities, hot rolling the slab into a hot-rolled strip, optionally annealing the hot rolled strip, subjecting to one cold rolling or two or more cold rollings the hot-rolled strip with intermediate annealing to form a final sheet thickness, decarburization annealing the cold-rolled sheet, coating the sheet with an annealing separator composed mainly of MgO and subjecting to final finish annealing, wherein the method is characterized by further comprising the step of nitriding steel from after decarburization annealing up to the start of secondary recrystallization, and wherein at least one member selected from among sulfides and selenides is used as a first inhibitor and at least one nitride formed by the nitriding is used as a second inhibitor, and primary recrystallization grains after completion of the decarburization annealing have an average grain diameter of not less than 7 μm and not larger than 15 μm ."

"2. A method for producing a grain-oriented electrical steel sheet comprising the steps of reheating to a temperature of more than 1050°C and lower than 1350°C a

slab having an initial thickness of about 30 to 70 mm comprising, by weight%, 0.025~0.10% of C, 2.5~4.0% of Si, 0.010~0.035% of acid-soluble Al, 0.0030~0.010% of N, $S_{eq}=(S+0.406 Se)$ of 0.008~0.05%, 0.02~0.20% of Mn, 0.02~0.30% of Cr, optionally at least one selected from 0.02~0.30% of at least one of Sn, Sb and P, 0.01~0.30% of Cu, 0.03~0.30% of Ni and 0.008~0.3% of at least one of Mo and Cd and the balance being Fe and unavoidable impurities, hot rolling the slab into a hot-rolled strip, optionally annealing the hot rolled strip, subjecting to one cold rolling or two or more cold rollings the hot-rolled strip with intermediate annealing to form a final sheet thickness, decarburization annealing the cold-rolled sheet, coating the sheet with an annealing separator composed mainly of MgO and subjecting to final finish annealing, wherein the method is characterized by further comprising the step of nitriding the steel sheet from after the decarburization annealing up to the start of secondary recrystallization, and wherein at least one member selected from among sulfides and selenides is used as a first inhibitor and at least one nitride formed by the nitriding is used as a second inhibitor, wherein the initial thickness of a slab for a grain-oriented electrical steel sheet is in the range between about 30 mm and 70 mm and primary recrystallization grains after completion of the decarburization annealing have an average grain diameter of not less than 7 μm and not larger than 15 μm ."

VI. The following documents played a role for the present decision:

D1: WO -A- 98/41659;

D4: WO -A- 98/08987;

D5: DE -A- 33 34 519; and

D6: EP -A- 0 743 370.

VII. The arguments of the appellant can be summarised as follows:

Added subject-matter

It was true that the ground of opposition under Article 100(c) EPC was withdrawn at the oral proceedings before the opposition division. However, the opposition division should have considered this ground of opposition of its own motion in view of its relevance. Therefore, by disregarding this ground of opposition, the opposition division had not exercised its discretion correctly. As a consequence, the decision to disregard the ground of opposition under Article 100(c) EPC should be overturned and this ground should be considered in appeal proceedings, without need for the consent of the patent proprietor.

Introduction of D5 and D6 into the proceedings

D5 and D6 had been submitted with the statement of grounds of appeal. Their submission was a reaction to the amendments performed during the oral proceedings in the opposition proceedings. Moreover, they corresponded to the prior art cited in the patent and, as a consequence, their submission could not take the respondent by surprise. Hence, D5 and D6 should be introduced into the proceedings.

Inventive step

D1, which belonged to the prior art because the first priority of the patent in suit was not validly claimed, represented the most relevant prior art for the

subject-matter of claim 1. The Ti content of the alloy used in the method of D1 was very low, so that it was to be considered as a unavoidable impurity in the sense of the patent in suit. As to the size of the primary recrystallization grains, the method of D1, which comprised the use of the same inhibitors and the performance of the same process steps as the claimed method, inherently resulted in primary recrystallisation grains with a size in accordance with claim 1. Therefore, the only difference between the claimed method and the disclosure of D1 was the Cr content of the alloy.

The effect of this difference was not only the formation of a forsterite film but in general an improvement of the magnetic properties. D5 disclosed that Cr improved the magnetic properties of an electrical steel of the same type used in the claimed method. Since the Cr content disclosed in D5 was within the range of claim 1, it was obvious to modify the method of D1 to use a steel with a Cr content in the claimed range. Hence, the subject-matter of claim 1 did not involve an inventive step in view of the combination of D1 and D5.

Moreover, since D6 also disclosed the beneficial effect of Cr on the magnetic properties, the subject-matter of claim 1 did not involve an inventive step in view of the combination of D1 and D6 either.

The subject-matter of claim 2 was also rendered obvious by the prior art. In this case the most relevant prior art was represented by D4. The Sn content disclosed in table 4 of this document was so low that for the person skilled in the art it was clear that the value was in wt% and not, as erroneously indicated in the table, in

ppm. In any event even if the value in ppm was to be considered, this was so low, that it clearly belonged to the unavoidable impurities in the sense of the patent. Since also in this in this case a size of the primary recrystallization grains according to claim 1 was inherent in the method disclosed in this document, the sole distinguishing feature was represented by the Cr content.

However, for the reasons explained for claim 1, the provision of this feature was rendered obvious by each of D5 and D6. Therefore, the subject-matter of claim 1 did not involve an inventive step in view of the combination of D4 and D5 or D4 and D6.

VIII. The arguments of the respondent can be summarised as follows:

Added subject-matter

Although an opposition division may introduce a new ground of opposition if it considers it prima facie highly relevant, it has no obligation to consider it of its own motion. In the present case the ground of opposition under Article 100(c) EPC had been raised and then withdrawn during the opposition proceedings. Hence, the opposition division had no reason at all to consider this ground or to reintroduce it under Article 114(1) EPC. Since no consent was given to its re-introduction in the appeal proceedings, objections under this ground should be disregarded.

Introduction of D5 and D6 into the proceedings

D5 and D6 could have been submitted already in the opposition proceedings since the claims under

consideration differed from the claims as granted in essence by the feature that Cr was not an optional but a compulsory alloying element. Hence, they should be disregarded.

Inventive step

In any event, even considering D5 and D6 could not lead to a denial of an inventive step for the claimed invention.

The most relevant prior art for claim 1 was represented by D1. The claimed method was distinguished from the method disclosed in this document not only by the Cr content, but also by the size of the primary recrystallization grains and by the Ti content, which could not be considered an impurity.

Neither D5 nor D6 rendered it obvious to modify the steel composition used in D1 by a Cr addition in accordance with claim 1. In both these documents the Cr addition was linked to mechanisms which were not used in the claimed method. In D5 it was linked to the addition of Al, which was not nitrided after the decarburising step as in the claimed invention, but used already as AlN to inhibit primary grain recrystallisation. As to D6, the Cr addition was disclosed in this document in combination with Mn contents higher than those of the claimed invention. Therefore, the subject-matter of claim 1 involved an inventive step.

In respect of claim 2 the most relevant prior art was represented by D4. The claimed method was distinguished from the method disclosed in this document not only by the Cr content but also by the Sn content, which could

not be considered an impurity, and the size of the primary recrystallization grains.

Also in this case, neither D5 nor D6 rendered it obvious to modify the steel composition used in D4 by a Cr addition in accordance with claim 2. Therefore, the subject-matter of claim 2 involved an inventive step too.

Reasons for the Decision

1. The appeal is admissible.
2. Added subject-matter
 - 2.1 In opposition proceedings it is primarily the responsibility of the opponent to raise and maintain the grounds of opposition that he wishes to be considered in the decision of the opposition division.

When this decision is appealed the purpose of the appeal procedure is, as laid down in decision G 9/91 (OJ EPO 1993, 408), mainly to give the losing party a possibility to challenge the decision of the opposition division on its merits. It is not in conformity with this purpose to consider a ground for opposition on which the decision of the opposition division has not been based. An exception to this principle may be considered in case the patentee agrees to the introduction of this fresh ground for opposition (G 9/91, point 18 of the Reasons for the Decision).

- 2.2 In the present case the ground of opposition under Article 100(c) EPC was raised for the first time at the

oral proceedings before the opposition division and was subsequently withdrawn at the same oral proceedings (see points 4 to 7 of the minutes). Since the opposition division did not raise it of its own motion either, this ground was not in the proceedings at the end of the oral proceedings before the opposition division.

Accordingly, the decision under appeal does not deal with this ground of opposition on its merits.

- 2.3 The appellant did not dispute this fact but argued that the opposition division decided not to raise this ground of its own motion by a wrong exercise of its discretion and that this discretionary decision should be overturned, thus introducing this ground of opposition into the proceedings.

It is true that the opposition division may in application of Article 114(1) EPC of its own motion raise a ground of opposition not covered by the notice of opposition. However, the fact that the opposition division did not make use of this possibility does not imply that it took a decision - subject to review of the board of appeal - to disregard it, as it might have been the case if this late-filed ground had been maintained.

Incidentally, it is pointed out that taking a different position on this point and accepting that all the grounds that have not been introduced *ex officio* have been the subject of a discretionary decision to disregard them would open the possibility to circumvent the principle laid down in decision G 9/91 that fresh grounds of opposition may not be introduced at the

appeal stage without the consent of the patent proprietor.

Indeed in the present case the decision under appeal does not deal with the admittance of the ground of opposition under Article 100(c) EPC either.

- 2.4 Since neither the merits nor the admittance of the ground of opposition under Article 100(c) EPC were the subject of the decision under appeal this ground is to be considered a fresh ground of opposition in the sense of decision G 9/91, which can be considered only with the consent of the patent proprietor. As this consent has been denied, this ground of opposition must be disregarded.

3. Introduction of D5 and D6 into the proceedings

D5 and D6 were submitted after expiry of the opposition period. Accordingly, it is within the discretionary power of the EPO to admit them or not into the proceedings (Article 114 (2) EPO).

However, both documents were submitted at the earliest possible stage in appeal proceedings, namely with the statement of grounds of appeal, in compliance with Article 12(2) RPBA.

Moreover, the present main request, whose independent claims recite Cr as a compulsory element, was filed at the oral proceedings before the opposition division. Hence, the submission with the grounds of appeal of D5 and D6, which disclose compositions comprising Cr, is considered as a reaction to this request and to the decision of the opposition division, which acknowledged an inventive step on the basis of the presence of Cr.

The fact that Cr was already contained in the granted claims as an optional alloying element, cannot change this view, since the opponent was not obliged to consider the possibility that Cr or any of the other numerous optional alloying elements might become a compulsory alloying element.

Finally, D5 and D6 correspond to the prior art acknowledged in paragraph [0004] of the patent in suit. As a consequence, their introduction into the proceedings cannot take the respondent by surprise.

Under these circumstances the Board decided to admit them into the proceedings.

4. Inventive step

4.1 Claim 1

4.1.1 D1 has been published between the first and the second priority date of the patent in suit. Since, as already established by the opposition division (decision under appeal, point 2), the first priority is not validly claimed, D1 belongs to the prior art according to Article 54(2) EPC. It is undisputed that this document represents the most relevant prior art for claim 1.

D1 discloses a method for producing a grain oriented electrical steel sheet (title) comprising the steps of reheating a slab to a temperature in the range of 1260°C to 1350°C (see page 7, lines 19-22 or page 9, last paragraph).

The process of D1 comprises hot rolling the slab into a

hot-rolled strip, subjecting to one or more cold rolling steps the hot-rolled strip with intermediate annealing to form a final sheet thickness, decarburization annealing the cold-rolled sheet, coating the sheet with an annealing separator composed mainly of MgO and subjecting to final finish annealing, wherein the method further comprises the step of nitriding the steel from after decarburization annealing up to the start of secondary recrystallization (see page 6 line 19 to page 7, line 14). Exemplary compositions of the slab are for instance given as casts 3 and 5 in example 3 (page 9). These compositions clearly exhibit contents of the alloying elements Si, C, Mn, S, Al, N and Cu in accordance with claim 1. In view of these compositions at least one member selected from among sulfides and selenides is formed, which, as a consequence, is used as a first inhibitor (see page 2, lines 4 to 16, although referring to prior art). Moreover, D1 discloses the formation by nitriding of at least one nitride, used as inhibitor (see page 6, first paragraph).

- 4.1.2 Starting from this prior art the object achieved by the method of claim 1 is to enable stable and simple production of a grain-oriented electrical steel sheet excellent in magnetic characteristics (paragraph [0006] of the patent in suit).

The Cr addition in accordance with claim 1 contributes to achieve this object, since Cr stabilises the formation of a forsterite glass film (see paragraph [0020], and [0004] of the patent), which has a beneficial effect on losses.

4.1.3 Contrary to the appellant's view neither D5 nor D6 rendered it obvious to achieve the object above in accordance with claim 1 starting from D1.

It is true that D5 discloses an electrical steel with a Cr content in accordance with claim 1 (see page 24, lines 24 to 28). However, the purpose of the Cr addition as disclosed in D5 is the broadening of the range of the acid soluble Al, which is not used to form nitrides in a nitriding step, but forms AlN together with the N already provided in the cast (see page 24, lines 15 to 17). By contrast, the role of Al in the process of D1 is different, because this process comprises - like the claimed method - a nitriding step to form AlN. Therefore, D5 does not teach that a Cr addition in the process of D1 can be advantageous.

D6 also discloses, on page 6, lines 5 to 11, the addition of Cr in an amount in accordance with claim 1 in an electrical steel. However, according to this passage chromium is included in the expression for the Mn equivalent, where the use of Mn and its equivalent is an essential part of the teaching of D6, with Mn amounts of typically at least 0.5% (page 5, lines 49 to 55). By contrast D1 (see example 3), like the patent in suit (claims 1 and 2), operates with lower Mn contents. Given this difference it would not be obvious for the person skilled in the art to apply the teaching of D6 concerning the Cr addition to achieve the given object.

Therefore, the subject-matter of claim 1 involves an inventive step.

4.2 Claim 2

4.2.1 D4, which undisputedly represent the most relevant prior art for claim 2, discloses a method for producing a grain-oriented electrical steel sheet (title) comprising the steps of reheating to a temperature in the range of 1050°C to 1350°C (page 5, lines 8 to 9) a slab. The slab has an initial thickness of about 30 to 70 mm (see page 5, lines 1 to 7). The process comprises hot rolling the slab into a hot-rolled strip, annealing the hot rolled strip, subjecting to one or more cold rolling steps the hot-rolled strip with intermediate annealing to form a final sheet thickness, decarburization annealing the cold-rolled sheet, coating the sheet with an annealing separator composed mainly of MgO and subjecting to final finish annealing, wherein the method further comprises the step of nitriding the steel from after decarburization annealing up to the start of secondary recrystallization (see page 5, line 10 to page 6, line 3; page 6, lines 18 to 24; cycle 3 on page 12 and page 10, lines 9 to 13). The slab in the exemplary compositions B1 and C1 of table 4 comprises alloying elements Si, C, Mn, S, Al, N and Cu in contents according to claim 2. From these compositions it is clear that at least one member selected from among sulfides and selenides is formed, which is used as a first inhibitor. Moreover, at least one nitride formed by the nitriding is used as a second inhibitor (see page 6, lines 18 to 24).

4.2.2 Also in this case, starting from this prior art the object achieved by the method of claim 2, which requires the same Cr addition as claim 1, is to enable stable and simple production of a grain-oriented electrical steel sheet excellent in magnetic characteristics (paragraph [0006] of the patent in suit).

4.2.3 By analogy to the reasons given above, neither D5 nor D6 rendered it obvious to add Cr in the amounts stipulated by claim 2 to achieve this object starting from D4.

Therefore, the subject-matter of claim 2 also involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



V. Commare

T. Kriner

Decision electronically authenticated