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D E C I S I O N
of 18 June 1998

Case Number: T 0905/96 - 3.2.1

Application Number: 92106289.9

Publication Number: 0508475

IPC: B21D 1/05

Language of the proceedings: EN

Title of invention:
Tension roller leveler

Patentee:
Sumitomo Heavy Industries, Ltd.

Opponent:
BWG Bergwerk- und Walzwerk-Maschinenbau GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"
"Late submission of auxiliary request (not admissible)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0905/96 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 18 June 1998

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 11 September 1996 rejecting the opposition filed against European patent No. 0 508 475 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. Alting van Geusau
Members: S. Crane
J. H. van Moer

Summary of Facts and Submissions

I. The mention of grant of European patent No. 0 508 475 in respect of the European application No. 92 106 289.9 filed on 10 April 1992 and claiming priority from the Japanese application No. 106515/91, was published on 15 February 1995.

Claim 1 of the patent reads as follows:

"1. A tension roller leveler comprising an upper frame (7) for mounting a plurality of upper work rolls (1a, 1b) thereon, a lower frame (8) for mounting a plurality of lower work rolls (2a, 2b) thereon in opposite relation to said upper work rolls (1a, 1b), and means (10a, 10b, 11a, 11b) for regulating relative positions of said upper frame (7) and said lower frame (8) to adjust opening degrees of said upper (1a, 1b) and lower work rolls (2a, 2b) in the inlet side and the outlet side for a strip (S), wherein said work rolls are each supported independently by one set of back-up rolls (3a, 3b, 4a, 4b) in two rows, and said back-up rolls (3a, 3b, 4a, 4b) in the two rows are arranged in a zig-zag pattern such that axial positions of shaft support portions of said back-up rolls (3a, 3b, 4a, 4b) in two rows will not overlap with each other."

II. Notice of opposition was filed on 28 October 1995 on the grounds of Article 100(a) EPC. In respect of an alleged lack of novelty and inventive step the opponent relied in particular on the document

D1: DE-A-2 134 405

and on alleged prior uses, the substantiation of which was supported by a number of documents.

III. By a decision issued in writing on 11 September 1996 the Opposition Division rejected the opposition.

The Opposition Division was of the opinion that the subject matter of claim 1 was novel and involved an inventive step because, starting from the prior art disclosed in D1, neither this document nor the alleged prior uses disclosed the concept of providing a zig-zag pattern of the back-up rolls for preventing prints of the joints between the divided rolls of each back-up roll being transferred to the surface of the strip via the work roll to appear as linear flaws.

IV. On 3 October 1996 a notice of appeal was lodged against that decision, the appeal fee having been paid on 2 October 1996.

The statement of grounds of appeal was filed on 21 November 1996. During the written appeal proceedings the appellant specifically referred to the additional prior art disclosed in

E20: Article: "Streckrichten, insbesondere von Nichteisenband", by R. A. Bland et al., published in "Aluminium" Volume 3, 1970, pages 235 to 240 and

E21: DE-C-2 536 583.

V. In a communication in preparation for oral proceedings the Board noted that document DE-B-2 536 582 (D5) cited in the European search report of the patent in suit, which concerned the same subject-matter as the patent E21 cited by the appellant, appeared to relate to the exchangeable traverse shown in the alleged prior uses.

Since D5, or E21, was published and thus publicly available before the priority date of the present patent and appeared to be relevant for the decision to be taken, it was considered appropriate to introduce this prior art into the appeal proceedings rather than to consider the alleged prior uses any further.

The Board further expressed the provisional opinion that the closest prior art appeared to be the prior art acknowledged in the patent, in particular the prior art disclosed in "Japanese Patent Publication No. 48-44629". The respondent was requested to file a copy of this document because the number indicated in the description of the patent appeared to be incorrect. Alternatively document E20 could be seen to represent the closest prior art.

In respect of the issue of inventive step an important point for discussion at the oral proceedings was for what reason the skilled person would be inclined to combine teachings from D6 or E20 (or the bending roller unit 8 disclosed in D1) with those of D5 (or E21) and why he would then arrive in an obvious manner at a tension roller leveller in accordance with claim 1 of the patent in suit.

VI. In response to the communication the respondent filed a copy of the Japanese patent publication No. 48-44629 together with a copy of its German counterpart

D6: DE-A-1 602 592.

The respondent further filed an auxiliary request I with the following independent claim:

"A tension roller leveler comprising

an upper frame (7) for mounting a plurality of upper work rolls (1a, 1b) thereon,

a lower frame (8) for mounting a plurality of lower work rolls (2a, 2b) thereon in opposite relation to said upper work rolls (1a, 1b),

means (10a, 10b, 11a, 11b) for regulating relative positions of said upper frame (7) and said lower frame (8) to adjust opening degrees of said upper (1a, 1b) and lower work rolls (2a, 2b) in the inlet side and the outlet side for a strip (S), and

bridle rolls (14a, 14b) respectively disposed on the inlet side and the outlet side of said work rolls (1a, 1b, 2a, 2b) for applying a predetermined tension to the strip (S),

wherein said work rolls are each supported independently by one set of back-up rolls (3a, 3b, 4a, 4b) in two rows, and said back-up rolls (3a, 3b, 4a, 4b) in the two rows are arranged in a zig-zag pattern such that axial positions of said back-up rolls (3a, 3b, 4a, 4b) in two rows will not overlap with each other,

wherein said one set of back-up rolls (3a, 3b, 4a, 4b) in the two rows is brought into contact with the associated work roll (1a, 1b, 2a, 2b) over substantially the entire length, and

wherein said tension roller leveler has a reform speed not lower than 350 mpm."

VII. Oral proceedings were held on 18 June 1998.

At the oral proceedings the respondent filed a second auxiliary request of which claim 1 reads as follows:

"1. A tension roller leveler comprising

an upper frame (7) for mounting a plurality of upper work rolls (1a, 1b) thereon,

a lower frame (8) for mounting a plurality of lower work rolls (2a, 2b) thereon in opposite relation to said upper work rolls (1a, 1b),

means (10a, 10b, 11a, 11b) for regulating relative positions and inclination of said upper frame (7) and said lower frame (8) to adjust opening degrees of said upper (1a, 1b) and lower work rolls (2a, 2b) in the inlet side and the outlet side for a strip (S), and

bridle rolls (14a, 14b) respectively disposed on the inlet side and the outlet side of said work rolls (1a, 1b, 2a, 2b) for applying a predetermined tension to the strip (S),

wherein said work rolls are each supported independently by one set of back-up rolls (3a, 3b, 4a, 4b) in two rows, and said back-up rolls (3a, 3b, 4a, 4b) in the two rows are arranged in a zig-zag pattern such that axial positions of said back-up rolls (3a, 3b, 4a, 4b) in two rows will not overlap with each other,

wherein said one set of back-up rolls (3a, 3b, 4a, 4b) in the two rows is brought into contact with the associated work roll (1a, 1b, 2a, 2b) over substantially the entire length."

The appellant requested setting aside of the decision under appeal and revocation of the patent.

The respondent requested that the appeal be dismissed and that the patent be maintained unamended (main request) or be maintained in amended form on the basis of the auxiliary requests I or II.

VIII. In support of its request the appellant relied essentially on the following submissions:

The closest prior art was represented by D6, in which tension roller leveler the back-up rollers were mounted in a staggered manner. Therefore, in its present broad definition, the claimed subject-matter appeared to lack novelty.

Reference could also be made to E20, which document disclosed on page 237 in "Bild 5" a staggered support of the work rolls for a tension roller leveler.

In case the subject-matter claimed would be considered novel, D5 was pertinent in that this prior art not only referred to the problem as indicated in the patent in suit, i.e. the known symmetrical support of the work rolls giving rise to flaws on the surface of the rolled strip, but furthermore disclosed the zig-zag pattern of work-roll support by the back-up rolls to avoid such linear flaws on the workpiece. It was therefore immediately apparent to the skilled person that a staggered support of the work-rolls in the manner as shown in D5 solved the underlying problem of the patent in suit. Consequently, the skilled person was led in an obvious manner to combine the teachings of D6 and D5 and by doing so immediately arrived at the subject-matter of the granted claim 1.

The subject-matter of claim 1 in accordance with auxiliary request I also followed immediately from the combination of teachings of D6, or E20, and D5. Although D6 did not explicitly disclose the use of bridle rolls, tension applying bridle rolls were implied by the fact that this prior art concerned a tension roller leveler of the type acknowledged in the description of the patent in suit.

The reform speed was not mentioned in D6 or D5 but that the high speed claimed was also achievable with the known arrangements, e.g. by the arrangement of D6, could already be derived from the patent in suit and could therefore not be seen to involve an inventive activity either.

Auxiliary request II was filed too late and should not be considered. In any case, this new claim appeared to infringe the requirements of Article 123(2) EPC.

IX. The respondent contested the appellant's view and its submissions in support of its requests can be summarised as follows:

As could be clearly derived from the drawings in D6, this known tension roller leveler did not disclose the zig-zag pattern of support of the work rolls in such a manner that the axial position of shaft support portions of the back-up rolls in two rows would not overlap with each other. The claimed tension roller leveler was therefore novel.

Starting from this known tension roller leveler the problem to be solved by the patent was the removal of residual curvatures such as curl and cross bow (see the patent column 2, lines 2 to 11) and at the same time to allow a high reform speed. The skilled person would not refer to D5 for solving this problem because this prior art related to a tension leveler instead of a tension roller leveler. Due to the differences in structure and levelling effect and due to the fact that neither of the prior art references contained a hint or information encouraging the skilled person to transfer the work roll support structure of a tension leveler to the different support structure of a tension roller leveler, the subject-matter of claim 1 as granted was based on inventive considerations.

The tension roller leveler defined in claim 1 of the first auxiliary request related to a combination of the subject-mater of the granted claims 1 to 3 and the use of bridle rolls for applying tension to the workpiece.

Such combination allowed very high reform speeds without producing abnormal noise and resonance which otherwise, in conventional high speed lines, resulted in chatter marks. The prior art disclosed in D6 or E21 and D5 did not suggest such a combination.

The late filing of auxiliary request II was due to the patentee's late submission of the request to the representative. The amended claim 1 differed from the tension roller leveler defined in claim 1 of the main request in that it further included means for regulating relative positions of the upper frame and the lower frame and bridle rolls. Since the cited prior art did not disclose or hint at the claimed combination the subject-matter of the auxiliary request was based on an inventive activity.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Novelty*

2.1 Novelty of the subject-mater of the main request follows from the fact that the closest prior art, represented by the disclosure of D6, does not reveal that the back-up rolls are arranged in two rows in a zig-zag pattern such that axial positions of shaft support portions of the back-up rolls in two rows will not overlap with each other.

2.2 The appellant considered that these features were in fact known from D6.

However, the Board notes that neither the description nor the drawings of D6 includes any reference to the claimed features. Having regard to the arrangement of the back-up rolls shown in the figures and described on page 4, last paragraph and page 5, first paragraph of D6, the back-up rolls for each single work roll are arranged in pairs at positions different from each other in the lengthwise direction of the work rolls such that one pair of back-up rolls support one work roll in an independent manner and the other pair of back-up rolls supports another work roll, adjacent to the one work roll, in an independent manner (see also the description of the patent in suit column 1, line 52 to column 2 line 1).

The appellant's interpretation of the disclosure of D6 to include back-up rolls arranged in the manner as claimed is therefore neither based on the technical disclosure of D6 nor is it implied thereby.

3. *Inventive step*

3.1 Independent support of the work rolls by two groups of back-up rolls arranged with a spacing therebetween in the lengthwise direction of the work rolls as disclosed in D6 allows different rotational speeds of the adjacent workrolls and thereby avoids the problem resulting from relative slip due to the plastic elongation of the workpiece during levelling and related noise and vibration difficulties. However, the resulting difference in press force between the portions where the work rolls are supported by the back-up rolls and the portions where they are not supported appear as linear flaws on the surface of the rolled strip (see column 3, lines 19 to 34 of the patent in suit).

3.2 The object underlying the subject-matter claimed in claim 1 of the patent in suit is to remove such flaws and improve the commercial value of the rolled strip.

3.3 This object is solved by the tension roller leveler claimed in claim 1 and, when compared to the known tension roller arrangement disclosed in D6, in particular by the arrangement of the back-up rolls in two rows in a zig-zag pattern such that the axial positions of shaft support portions of the back-up rolls in the two rows will not overlap with each other.

The respondent submitted that also the feature according to which the work rolls were supported in adjustable frames was not disclosed in D6. However, the impact of this feature on the claimed solution of the problem stated was not further substantiated.

In any case, although D6 indeed lacks any reference to the constructional details for support of the work rolls (Figures 2, 4 and 5 merely show that the support of the back-up rolls is in frames) the competent skilled person is very well able to complete the disclosure of D6 with his general knowledge.

Having regard to the common construction of tension roller levellers such as disclosed in D1 and E20, the principal constructional features of support and adjustment of the work rolls are not different from those disclosed in Figures 1 and 3 of the patent in suit and must be considered to represent the common practice in this technical field. Therefore, when interpreted by the skilled person, the disclosure of D6 must be considered to include such common support and adjustability of the work rolls.

3.4 Faced with the stated problem, the recognition of which in itself cannot be attributed any inventive merit because the appearance of the flaws and the need for improvement is immediately apparent, the skilled person would certainly become aware of D5.

This document concerns a tension leveler in which the work roll is supported by a two rows of back-up rolls and in which in one embodiment the two rows are arranged side by side and in another embodiment the two rows are arranged in a zig-zag pattern such that the axial positions of shaft support portions will not overlap with each other. In accordance with the explanations in the description (column 4, lines 1 to 6), the latter arrangement, when compared to the first arrangement of the back-up rolls, avoids the occurrence of flaws due to the pressure differences on the workpiece.

In view of the comparison of the two arrangements of the rows of back-up rolls and the solution given in the second embodiment the skilled person would immediately draw a parallel with the present problem to be solved and apply the teaching of D5 to the tension roller leveler known from D6 by rearranging the two rows of support rolls in the manner as shown in the second embodiment shown in D5. By applying such an obvious application of the teaching given in D5 the skilled person would immediately arrive at the arrangement claimed in claim 1.

3.5 The respondent argued that a tension roller leveler, such as disclosed in D6, and a tension leveler, such as disclosed in D5, were principally different arrangements and that therefore the skilled person would not transfer the work roll support structure from the one to the other.

It is accepted that a tension roller leveler and tension leveler are different means for levelling rolled workpieces. However, as is shown by D1 both levellers can be used in the same plant. Moreover, considering that the problem encountered essentially relates to support means of work rolls for applying a predetermined pressure on the strip, which problem is independent whether a tension roller leveler or a tension leveler is concerned, the Board sees no bar to an adaptation of the work roll support known from D6 to the work roll support known from D5 so as to improve work roll support with a view to avoid the risk of the occurrence of linear flaws following from the work roll support.

3.6 The Board is therefore the view that the subject-matter of claim 1 of the main request is arrived at in an obvious manner when taking into account the prior art disclosed in D6 and D5 and consequently lacks an inventive step within the meaning of Article 56 EPC.

Auxiliary request I

4. *Amendments*

The claim in accordance with the first auxiliary request is a combination of the subject-matter of the granted claims 1 to 3 and further comprises the feature that bridle rolls are disposed on the inlet side and the outlet side of the work rolls for applying a predetermined tension to the strip.

No objections in respect of the requirements of Article 123(2) and (3) EPC arise against this claim.

5. *Novelty*

When compared to the disclosure of D6, which document is again considered to represent the closest prior art, the tension roller leveler defined in the claim in accordance with the auxiliary request I differs from the known tension roller leveler in that the lattter is not explicitly stated to comprise the following features:

- bridle rolls respectively disposed on the inlet side and the outlet side of said work-rolls for applying a predetermined tension to the strip,

- the back-up rolls in two rows are arranged in zig-zag pattern such that axial position of said back-up rolls in two rows will not overlap with each other,

- the one set of back-up rolls in the two rows is brought into contact with the associated work roll over substantially the entire length, and

- the tension roller leveler has a reform speed not lower than 350 mpm.

In so far novelty of the subject-matter claimed can be concluded.

6. *Inventive step*

6.1 The problem to be solved by the subject-matter of the claim in accordance with the auxiliary request can be seen to relate to the avoidance of flaws on the workpiece at high reform speeds.

6.2 When considering D6 more in detail, although essentially concerned with the support of the work rolls, this known leveler necessarily comprises means for providing tension in the workpiece because it concerns a **tension** roller leveler, which fact is also acknowledged in the patent in suit.

Furthermore, in commenting on the prior art in D6 (see page 2, second paragraph of D6) bridle rolls are described for providing the tension in the workpiece and therefore it would be an obvious choice for the skilled person to provide the required tension in the strip by such conventional means.

D6 also discloses that, by supporting the work rolls each by their own back-up rolls, the problem of relative slip at any location in the roller leveler is removed and, taking into account the explanations in the patent in suit in column 2, line 34 to column 3, line 3, the conclusion is drawn that the leveller is thereby made suitable for reform speeds in excess of 300 mpm.

6.3 For the reasons already set out in the paragraphs dealing with the main request the skilled person was led to combine the teachings of D6 with those of D5 when trying to find a solution to the problem of linear flaws on the strip due to uneven support of the work rolls.

D5 shows how to remove this deficiency by placing the back-up rolls in two rows in a zig-zag pattern and such that axial positions of shaft support portions of the back-up rolls will not overlap with each other. D5 also shows that the back-up rolls are brought into contact with the work roll over substantially its entire length.

Therefore when combining the teachings of D6 with those of D5 for solving the underlying problem of the patent in suit, the skilled person would immediately arrive at the constructional features of the tension roller leveler claimed in the respondent's auxiliary request I.

Since the tension roller leveler arrived at by the obvious combination of teachings of D6 and D5 must be considered suitable for reform speeds in excess of 300 mpm the mere selection of a reform speed of 350 mpm cannot be seen to substantiate any inventive activity. Therefore the claim of the auxiliary request is also not acceptable for lack of inventive step of its subject-matter.

7. The respondent submitted that, in accordance with the description of the patent, the problem to be solved did not only concern the linear flaws resulting from the insufficient support of the work rolls but also concerned curl and cross bow deficiencies (see column 2, line 6 to 8) as well as noise and vibration problems.

In this respect the Board notes that, when compared to the tension roller leveler resulting from the obvious combination of the teachings of D6 and D5, the tension leveler claimed in the auxiliary request I does not comprise any additional features which could be seen to have an impact on the levelling process in a manner that different results were achieved (see also the description of the patent in suit in column 6, lines 26 to 54).

Moreover, concerning the suitability for high reform speeds of the tension roller leveler known from D6, the object relating to the noise and resonance at high reform speeds was already solved by the prior art

disclosed in D6 so that in fact only the problem of the strip surface flaws caused by transferral of the joints between the divided rolls of each back-up roll to the surface of the strip remained to be solved.

8. *Auxiliary request II*

8.1 It belongs to the established case-law of the Boards of appeal that the admission of amended claims into the appeal proceedings, particularly when the amendments are first submitted at oral proceedings, is at the discretion of the Boards (see for example T 95/83, OJ 1985, 75 and T 152/85, OJ 1988, 1).

The factors which need to be taken into account when exercising this discretion include whether there is good reason for the late submission of the amendments and whether the amendments are clearly allowable, firstly in the sense of conforming with the formal requirements of the EPC and secondly in the sense of having at least a reasonably prospect of removing the outstanding substantive objections against the documents previously on file.

8.2 In the present case the representative submitted at the oral proceedings that the respondent had proposed the amended claim in accordance with the auxiliary request II only shortly before the oral proceedings so that he had not been in the position to file the claims earlier. In respect of the amendment concerning the possibility of inclination of the upper and lower frame the representative submitted that this was derivable from the text in the patent description in column 5, lines 15 to 20).

8.3 Having regard to the above requirements following from the established case-law, the Board is of the opinion that no valid reason for the late filing of the auxiliary request II exists. The amendments did neither result from specific objections made earlier in the proceedings nor did they result from discussions in the oral proceedings and could therefore have been filed within the time limit set in the Board's communication dated 27 November 1997.

8.4 When having regard to the formal acceptability of the amendments, it has to be noted that the insertion of the feature relating to the inclination of the upper frame and the lower frame is a generalisation of the arrangement in accordance with the preferred embodiment disclosed in the patent in suit, in which only the inclination of the lower frame is adjustable. The present amendment does therefore not have any direct support in the patent or application as originally filed so that it cannot be said either that the amendment is clearly allowable. In fact the appellant was of the opinion that this amendment did not meet the requirement of Article 123(2) EPC.

8.5 Also in respect of the substantive issues involved it must be noted that claim 1 in accordance with the auxiliary request II differs only from claim 1 of the auxiliary request I in that the inclination of the upper and lower frames is adjustable and in that the reference to the reform speed was omitted.

Since the adjustability of the relative inclination of the supporting frames for the rollers is a known feature in tension roller levellers, as is apparent from D1 (Figure 3) and E20 (see the Figures on page 239) and does not add anything in relation to the

solution of the problem stated, the Board does not see why this conventional feature would render the subject-matter of claim 1 of the second auxiliary request inventive.

8.6 In view of these assessments, the Board comes to the conclusion that claim 1 of the auxiliary request II does not fulfill any of the required conditions for admissibility of the amendments. The auxiliary request II is therefore inadmissible and the Board accordingly rejects it.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

S. Fabiani P. Alting van Geusau