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**D E C I S I O N**  
**of 16 October 2003**

**Case Number:** T 0693/01 - 3.2.1

**Application Number:** 94102797.1

**Publication Number:** 0615793

**IPC:** B21B 1/26

**Language of the proceedings:** EN

**Title of invention:**

Hot steel plate rolling mill system and rolling method

**Patentee:**

Hitachi, Ltd.

**Opponent:**

SMS Demag AG

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 111(1)

**Keyword:**

"Inventive step (main request) no"  
"Late-filed claims (first auxiliary request) not admitted"  
"Decision re appeals - exercise of discretion (second  
auxiliary request) - remittal (yes)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0693/01 - 3.2.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.1**  
**of 16 October 2003**

**Appellant:**  
(Opponent)

SMS Demag AG  
Eduard-Schloemann-Strasse 4  
D-40237 Düsseldorf (DE)

**Representative:**

Valentin, Ekkehard, Dipl.-Ing.  
Patentanwälte  
Hemmerich-Müller-Grosse-Pollmeier-  
Valentin-Gihske  
Hammerstrasse 2  
D-57072 Siegen (DE)

**Respondent:**  
(Proprietor of the patent)

Hitachi, Ltd.  
6, Kanda Surugadai 4-chome  
Chiyoda-ku,  
Tokyo 101 (JP)

**Representative:**

Siegfried, J., Dipl.-Ing.  
Beetz & Partner  
Patentanwälte  
Steinsdorfstrasse 10  
D-80538 München (DE)

**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted 18 April 2001  
rejecting the opposition filed against European  
patent No. 0615793 pursuant to Article 102(2)  
EPC.**

**Composition of the Board:**

**Chairman:** S. Crane  
**Members:** F. J. Pröls  
G. E. Weiss

## Summary of Facts and Submissions

I. European patent No. 0 615 793 was granted on 29 July 1998 on the basis of European patent application No. 94 102 797.1.

The granted patent has two independent claims, which read as follows:

"1. Hot rolling mill system comprising

- at least one rough rolling mill (3 to 5) and
- a finishing rolling mill train (23) including in an upstream stage at least one rolling mill (12, 13) and in a downstream stage a plurality of four- or six-high rolling mill (14 to 16) characterized in that
  - the work rolls (35, 36) of the four- or six-high rolling mills (14 to 16) in the downstream stage of the finishing rolling mill train (23) have a diameter of not more than 450 mm, and are indirectly driven by the supporting rolls (33, 34) of said four- or six-high rolling mills (14 to 16)
  - offset devices (37 to 40) are provided for offsetting the small diameter work rolls (35, 36) in the rolling direction and
  - thinning means (12, 13; 28) are provided in the up-stream stage of the rolling mills (14 to 16) of the small diameter work rolls (35, 36) for thinning the rough rolled hot slab (88) to a biting thickness of the following work rolls (35, 36) of not more than 450 mm diameter.

31. A hot rolling method using a hot rolling mill system in which a hot slab will be rolled in at least one rough rolling mill (3-6) and afterwards, in a finish rolling mill train (23) including a plurality of four- or six-high rolling mills (24, 25, 14-16)

characterized by the steps of:

- said four- or six-high rolling mills (14-16) in the finish rolling mill train (23), each having work rolls (35, 36; 43, 44; 60, 61; 64, 65; 70, 71; 74, 75; 80, 81) of a small diameter not more than 450 mm are indirectly driven through their associated back-up (33, 34; 47, 48; 62; 63; 68, 69; 72, 73; 78, 79; 82-85) or intermediate rolls (45, 46; 66, 67),
- thinning a leading end portion of the rough-rolled hot slab, and
- rolling the thinned hot material by the finish rolling mills (14-16) of the small-diameter work rolls with a strong draft and a low speed."

II. The granted patent was opposed in its entirety by the appellants on the grounds that its subject-matter lacked inventive step (Article 100(a) EPC). The state of the art relied upon included the following documents:

(D1) "Stahl und Eisen" 108 (1988), Nr. 6, 21 März 1988 pages 257 bis 265, entitled:

"Modernisierung der Mittelbandstraße Hoesch Hohenlimburg AG"

(D2) Report: "Walzwerksanlagen der SMS Schloemann-Siemag AG, Mai 1988" entitled:

"High-Tec Rolling: Verbesserung der Wirtschaftlichkeit und Produktqualität in Warmband- und Kaltbandwalzwerken".

III. The Opposition Division rejected the opposition with its decision posted on 18 April 2001.

IV. A notice of appeal against this decision was filed on 21 June 2001 and the fee for appeal paid at the same time. The statement of grounds of appeal was filed on 17 August 2001.

In the appeal procedure reference was also made with regard to the question of inventive step to the further documents:

(D3) DE A-31 07 693

(D4) "Walzwerke, Maschinen und Anlagen, VEB Deutscher Verlag für Kunststoffindustrie, Leipzig 1979, pages 23, 63".

(D5) PATENT ABSTRACTS OF JAPAN vol. 7, No. 112 (M-215) 17 May 1983 & JP-A-58 032 502 (SUMITOMO) 25 February 1983.

Of these, document D3 had first been cited by the appellants in the course of the opposition proceedings (and not been considered by the Opposition Division for reasons of Article 114(2) EPC.) Document D5 had already been cited in Search Report.

V. Oral proceedings before the Board were held on 16 October 2003.

The appellants requested that the decision under appeal be set aside and that the European patent be revoked.

The respondents (patentees) requested that the appeal be dismissed and the patent be maintained as granted (main request) or in the alternative in amended form on the basis of claims 1 to 32 filed as the then "auxiliary request II" with fax dated 30 September 2003 (present first auxiliary request) or on the basis of granted method claims 31 to 34 (present second auxiliary request).

Claim 1 according to the present first auxiliary request reads as follows:

Hot rolling mill system comprising

- at least one rough rolling mill (3 to 5) and
- a finishing rolling mill train (23) including in an upstream stage at least one rolling mill (12, 13) and in a downstream stage a plurality of four- or six-high rolling mills (14 to 16) having work rolls (35, 36) of a diameter of not more than 450 mm,  
characterized in that
- the work rolls (35, 36) of the four- or six-high rolling mills (14 to 16) in the downstream stage of the finishing rolling mill train (23) are indirectly driven by the supporting rolls (33, 34)

- of said four- or six-high rolling mills (14 to 16),
- offset devices (37 to 40) are provided for offsetting the small diameter work rolls (35, 36) in the rolling direction and
  - instead of the at least one-rolling mill (12, 13) in the upstream stage of the finishing train (23) thinning means (14, 28) are provided in the downstream stage of the rolling mills (14 to 16) of the small diameter work rolls (35, 36) for thinning the leading end portion of the rough rolled hot slab (88) to a biting thickness of the following work rolls (35, 36) of not more than 450 mm diameter."

VI. In support of their request the appellants argued substantially as follows:

(i) main request:

All features specified in claim 1 were to be found in the combination of the documents D1 and D2 which would lead the person skilled in the art to the hot rolling system according to granted claim 1.

(ii) first auxiliary request:

Claim 1 of the late filed present first auxiliary request was not clearly allowable having regard to all relevant provisions of the EPC, since the teaching of claim 1 and particularly the proposed amendments were not straightforward in nature and could not be easily understood. Thus the first auxiliary request must be considered inadmissible.

(iii)second auxiliary request:

The independent method claim of this set of claims was clearly obvious in regard of the cited prior art. Document D5 which had already been cited in the search report but had not yet been considered in the procedures before the European Patent Office clearly shows a method for thinning the leading end portion of a slab so that even this step cannot add anything inventive to be the further claimed obvious rolling method.

VII. The arguments of the respondent in reply can be summarized as follows:

The basic idea of the patent in suit consists in providing a mini hot rolling system for small scale production which has not only small dimensions as concerns the size of the individual units but in the first place has a short total length of the plant. Contrary to the conventional plants as shown in D1 the patent specification only requires three four-high rolling mills in the finishing rolling mill train whereas the known plant has seven four-high rolling mills. Only two of these seven mills have small diameter work rolls. D1 furthermore does not disclose whether the mall diameter rolls are indirectly driven and can be off set in the rolling direction. For the rest D1 also does not reveal any means for thinning a slab to a thickness which the small diameter work rolls can bite. No explanation is given in D1 as to how the two-high rolling mills correspond to thinning means.



Therefore the skilled man would not consider the disclosure in D1 as basis for a further development of a "mini hot". Small diameter work rolls with offset devices are indeed known in cold rolling mills, however in D2 which discloses such means there are given no hints that this technology as described in D2 in the chapter "cold rolling mills" is also used in hot rolling mills. Thus neither D1 nor D2 can be considered as encouraging the skilled person to combine several components which are disclosed in them in isolation. For these reasons granted claim 1 is obvious.

Claim 1 according to the present first auxiliary request differs from claim 1 as granted only in the sense that the at least one rolling mill (12,13) should no longer be considered to represent the thinning means, which in amended claim 1 are provided for thinning "the leading end portion" of the rough rolled hot slab. Such thinning means have been clearly described in the patent specification. Thus, claim 1 as amended, even if considered as late-filed, should be admitted.

The claim set according to the second auxiliary request first filed at the oral proceedings completely corresponds to the method claims 31 to 34 as granted. Under these circumstances nothing has changed except that the device claims have been cancelled. The method claims which are restricted to means for thinning the leading end portion of the slab should also be considered admissible and inventive.

## Reasons for the Decision

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.
  
2. *Main request*
  
- 2.1 As set out in the introductory description of the patent specification the claimed hot rolling mill system is concerned with small-scale hot strip mills ("mini hots") having an annual yield in the order of one only million tons contrary to hot strip mills of the mass production type with a yield of 3 to 6 million tons per year. In typical hot strip mills the maximum finish rolling speed is said to be in the range of 700 to 1600 m/minute, the number of stands is high and a very large motor power is required. Low speed, however, is said to be preferable for "mini hots".

The object of the claimed system is to overcome the technical problem in the realization of such low-speed rolling and to provide a rolling mill system and method realizing a small scale production of hot strips and having a compact structure of equipment.

- 2.2 Document D1 describes the modernization of a hot rolling mill system which has according to the output of the casting furnace (as set out in Table 1 of D1) a yield which lies in the yield range of a "mini hot". The modified version of the plants as shown in Figure 1 of D1 discloses besides a rough rolling mill (see "Vorstraße") also a finishing rolling mill train including in an upstream stage two two-high rolling

mills and in a downstream stage a plurality (7 mills are shown) of four-high rolling mills. Thus, the features as set out in the precharacterising part of claim 1 of the patent in suit are indisputably known from D1. From Table 3 on page 263 in connection with the description on page 262, right column, last but one paragraph of D1 can be derived that the first two four-high rolling mills (following the two two-high rolling mills) are provided with small diameter work rolls having a diameter of not more than 450 mm.

It is clear for a skilled man that the two two-high rolling mills which are provided in the up-stream stage of the rolling mills with the small diameter work rolls necessarily represent thinning means for thinning the rough rolled hot slabs to a biting thickness of the following work rolls of not more than 450 mm.

Consequently the rolling mill as disclosed in D1 in principle reveals all features of claim 1 of the patent specification except that D1 does not explicitly show that the small diameter work rolls are indirectly driven by supporting rolls and are provided with offset devices for offsetting the small diameter work rolls in the rolling direction.

- 2.3 It is generally known in the theory of cold and hot rolling mills that small diameter work rolls which are used in the plant according to D1 must be indirectly driven by supporting rolls, since otherwise the driving torque must be restricted.

Furthermore it is also generally known that small diameter work rolls even if indirectly driven by supporting rolls are elastically deformed by the horizontal component of the force acting on the slabs in circumferential direction of the rolls and that this detrimental effect can be counteracted by offset devices for offsetting the small diameter rolls in the rolling direction (horizontal direction). In D2, page 11, left column and page 12, right column, this theory, though described in a chapter concerning cold rolling mills, is expressly mentioned in connection with cold and hot rolling mills. Therefore it can be concluded that the four-high hot rolling mills with small diameter work rolls according to D1 will in practice necessarily be indirectly driven by the supporting rolls and should be offset in the rolling direction if high reduction ratios are desirable.

Present claim 1, contrary to the appellants' argumentation at the oral proceedings, is not restricted to a certain low number of mills in the finishing rolling train so that the plant known from D1 does not differ from the claimed system with regard to this question.

The subject-matter of claim 1 therefore lacks inventive step.

3. *First auxiliary request*

Amended claim 1 first has been filed about two weeks before the oral proceedings, so that the period of one month fixed in the Board's communication pursuant to Article 11(1) of the Rules of Procedure of the Boards

of Appeal has not been observed. Such late-filed amendments are according to the established jurisprudence of the Boards of Appeal only admitted if they are clearly allowable having regard to all relevant provisions of the EPC and provided that the circumstances are such that the opponents are not disadvantaged in their right to give proper consideration to the new amendments.

Amended claim 1 requires in its precharacterising part that "the at least one rolling mill (12, 13) in the upstream stage of the finishing train" as set out in the granted claim 1 and still present in the precharacterising part of amended claim 1 is replaced by "thinning means (14, 28) provided in the downstream stage of the rolling mills (14 to 16) of the small diameter work rolls for thinning the leading end portion of the rough rolled hot slab 188)...". In connection with these sentences the unusual wording in claim 1 that the "thinning means (14, 28)...for thinning the leading end portion" are provided "instead of the at least one rolling mill (12, 13)... which forms part of the teaching of claim 1 as granted raises the question whether this amendment is allowable under Article 123(3) EPC (extension of the protection conferred).

Furthermore claim 1 as amended states that the thinning means are provided in the downstream stage of the rolling mills of the small diameter work rolls. This is, however, inconsistent to the corresponding disclosure of claim 1 as granted according to which the thinning means in accordance with the description are

provided in the up-stream stage of the rolling mills of the small diameter work rolls.

Accordingly amended claim 1 raises difficult questions as concern extension of the protection, clarity and compatibility with the description, so that this claim does not meet the established requirements for being admitted at such a late stage in the procedure.

The first auxiliary request is therefore inadmissible.

4. *Second auxiliary request*

According to this request all device claims 1 to 30 of the patent in suit have been cancelled and only the independent method claims 31 to 34 have been maintained. These method claims exclusively concern those parts of the patent in suit which describe the thinning process by which the rough rolled slabs are thinned only at their leading end portions.

Thus the second auxiliary request only deals with facts already present in an independent set of unamended method claims of the patent specification and is therefore in principle admissible even if late-filed.

The claimed method contains contrary to cancelled claim 1 of the patent specification the additional feature that the slabs are thinned at their leading end portion. The patent in suit has not yet been considered in this view in the opposition procedure and the decision under appeal. Besides this the restriction of the patent in suit to the granted method claims require also essential modifications of the extensive

description and the drawings of the patent specification. Such modifications, however, are not negligible as concern the interpretation of the method claims in the sense of Article 69(1) EPC and the examination on inventiveness particularly as regards the prior art including the Patent Abstracts of Japan vol. 7, No. 112 (M-215) 17 May 1983 & JP-A-58 032 502 (Sumitomo) 25 February 1983 as set out on page 1 of the patent specification and cited by the appellants at the oral proceedings in their reply to the second auxiliary request.

Until it has been established how the terms of the independent method claim shall be interpreted on the basis of Article 69(1) EPC further considerations of patentability are superfluous.

The Board therefore considers it appropriate to make use of its discretion in accordance with Article 111(1) EPC to remit the case to the first instance for further prosecution. The subject-matter to be reconsidered in the first instance is restricted to method claims based on those as set out in the patent specification.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution on the basis of the granted method claims 31 to 34.

The Registrar:

The Chairman:

S. Fabiani

S. Crane