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Datasheet for the decision of 2 July 2020

Case Number: T 1109/17 - 3.2.03

Application Number: 12184124.1

Publication Number: 2572808

IPC: B21B13/14, B21B29/00

Language of the proceedings: EN

Title of invention:
Cold-rolling mill, tandem rolling system, reversing rolling system, modification method of rolling system, and operating method of cold-rolling mill

Patent Proprietor:
Mitsubishi-Hitachi Metals Machinery, Inc.

Opponent:
SMS group GmbH

Headword:

Relevant legal provisions:
EPC Art. 54(1), 56

Keyword:
Novelty - (yes)
Inventive step - (yes)

Decisions cited:
T 0240/95

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 1109/17 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 2 July 2020

Appellant: (Patent Proprietor)	Mitsubishi-Hitachi Metals Machinery, Inc. 34-6, Shiba 5-chome Minato-ku Tokyo 108-0014 (JP)
Representative:	Strehl Schübel-Hopf & Partner Maximilianstrasse 54 80538 München (DE)
Respondent: (Opponent)	SMS group GmbH Eduard-Schloemann-Strasse 4 40237 Düsseldorf (DE)
Representative:	Klüppel, Walter Hemmerich & Kollegen Patentanwälte Hammerstraße 2 57072 Siegen (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 24 February 2017 concerning maintenance of the European Patent No. 2572808 in amended form.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The patent proprietor (hereafter "the appellant) lodged an appeal in the prescribed form and within the prescribed period against the decision of the opposition division maintaining European patent No. 2 572 808 in amended form on the basis of the then first auxiliary request.

II. The opposition was directed against the patent as a whole and based on Article 100(a) EPC (lack of novelty and/or inventive step).

The opposition division held that the subject-matter of claim 1 of the patent as granted (then main request) lacked novelty with respect to DE 102 08 389 A (E1) and that the then first auxiliary request fulfilled the requirements of the EPC.

III. With the statement setting out the grounds of appeal the appellant requested

that the decision be set aside; and
that the patent be maintained as granted.

With its letter of reply the opponent (hereafter the "respondent") requested:

that the appeal be dismissed.

IV. In a communication pursuant to Article 15(1) RPBA 2020 dated 25 March 2020, annexed to the summons to oral proceedings, the board provided the parties with its preliminary, non-binding opinion that the claimed subject-matters of the patent as granted seemed to be

novel and inventive over the available prior art such that the patent would likely be maintained as granted.

None of the parties reacted in substance to the board's preliminary opinion.

The respondent informed the board with letter dated 23 June 2020 that they **will not be represented at the oral proceedings** scheduled for 20 July 2020.

Consequently, in view of its preliminary opinion and in the absence of a reaction thereto by the parties, the board considered it expedient to cancel the oral proceedings since a decision could be taken on the basis of the written submissions.

V. Claim 1 of the patent as granted reads as follows:

"A cold-rolling mill for rolling a steel strip of minimum width not less than 600 mm and maximum width not less than 1,500 mm but not greater than 1,900 mm, the mill comprising:

a pair of upper and lower work rolls (2, 2);
a pair of upper and lower intermediate rolls (3, 3) supporting the work rolls, respectively;
a pair of upper and lower buck-up rolls (4, 4) supporting the intermediate rolls, respectively;
an axial direction roll shifting device (23) for each of the intermediate rolls; and
bending devices (10, 11) for each of the work rolls and the intermediate rolls;
wherein the work rolls each have a diameter not less than 300 mm but not greater than 400 mm, characterized in that the intermediate rolls each have a diameter not less than 560 mm but not greater than 690 mm."

The apparatus claims 9 and 10 and method claims 11 and 12 of the patent as granted comprise the cold-rolling mill of claim 1. Hence, in view of the outcome of the present decision on the basis of claim 1, there is no need to recite their wording.

VI. The following documents of the opposition proceedings are relevant for the decision:

E1: DE 102 08 389 A;
E2: JPH 03 207506 A;
E2a: Bibliographic data of E2 with abstract;
E3: JPS 59 185508 A; and
E3a: Bibliographic data of E3 with abstract.

VII. The appellant argued essentially as follows:

One of the aims of E1 is the retrofitting of 4-high mills with limited height into 6-high mills. At the time the invention was made, suitable 4-high mills for such retrofitting were 1,200 mm or 1,500 mm width mills. E1 focuses on finding suitable diameter ranges or widths of the work rolls or intermediate rolls for these classes of rolling mills. For mills of these widths (1,200 mm or 1,500 mm), the combination of work roll and intermediate roll diameters derivable from E1 does not overlap with the claimed ranges.

E1 does not disclose any example of a rolling mill with maximum strip widths exceeding 1,500 mm. The value of 1,700 mm is not disclosed or otherwise singled out in E1. Structural features need to be present for large cold-rolling mill ranging from 1,500 to 1,900 mm as claimed and E1 is silent in this respect. Hence, the skilled person would not derive that the teaching of E1

would also apply to widths greater than 1,500 mm, e.g. 1,700 mm.

Even if the value of 1,700 mm were to be considered as disclosed in E1, the skilled person would still have to make two further selections to obtain a combination of diameters falling simultaneously within the two claimed ranges of work roll and intermediate roll diameters. E1 does not contain any hint towards such a combination of roll diameters. Hence, the skilled person would not seriously contemplate working simultaneously within the two ranges of overlap between, on the one hand, the disclosed and claimed work roll diameters and, on the other hand, the disclosed and claimed intermediate roll diameters. The two ranges of overlap represent a narrow selection of the combined disclosed work roll and intermediate roll diameters.

For these reasons E1 does not disclose the following features of claim 1 of the patent as granted:

(a) a cold-rolling mill for rolling a steel strip of minimum width not less than 600 mm and maximum width not less than 1,500 mm but not greater than 1,900 mm;
(b) the work rolls each have a diameter not less than 300 mm but not greater than 400 mm; and
(c) the intermediate rolls each have a diameter not less than 560 mm but not greater than 690 mm.

Consequently, the subject-matter of claim 1 is novel.

On the basis of these distinguishing features over E1 taken as closest prior art, the problem to be solved derivable from the technical effects can be seen as to enable rolling harder high strength steel strips than

ever, or at higher reduction ratios for high strength steel strips of the same hardness as before.

None of the available prior art documents provides a hint for selecting the diameter of the intermediate roll in the claimed range of 560 to 690 mm for a work roll diameter in the range of 300 to 400 mm.

Consequently, the subject-matter of claim 1 is inventive.

VIII. The respondent argued essentially as follows:

Figures 1 to 3 of E1 disclose curves which encompass values up to 1,700 mm for the maximum width. This value is therefore to be seen as disclosed, in particular since it appears as a limit of the disclosed range.

For values of around 1,500 to 1,800 mm of maximum width the disclosed and claimed work roll diameters overlap. For values of around 1,630 to 1,900 mm of maximum width the disclosed and claimed intermediate diameters overlap. Hence, the disclosed and claimed ranges of work roll and intermediate roll diameters simultaneously overlap for values from 1,630 mm to 1,800 mm maximum width. This range of overlap is not narrow and not limited to the single value of 1,700 mm maximum width.

The maximum width of feature (a) relates to the suitability of the claimed cold-rolling mill for rolling steel strips in the claimed maximum width range. Since the cold-rolling mill of E1 is suitable for rolling such steel strips, feature (a) is disclosed in E1.

The claimed range for the work roll diameter (100 mm = 400 - 300 mm) is broader than the one disclosed in E1 (75 mm = 458 - 383 mm). The same applies for the claimed range of the intermediate roll diameter in comparison with the one disclosed in E1. Hence, since the disclosed and claimed ranges overlap for the work roll and intermediate roll diameters features (b) and (c) cannot confer novelty.

E1 discloses all the features of claim 1 of the patent as granted and, hence, its subject-matter lacks novelty over E1.

Reasons for the Decision

1. Novelty - claim 1 of the patent as granted

The appellant contests the finding of the impugned decision, point 10 of the reasons, that the subject-matter of claim 1 of the patent as granted lacks novelty over E1.

The board agrees with the appellant for the following reasons given in the board's communication dated 25 March 2020 pursuant Article 15(1) RPBA 2020 which has not been subsequently commented on or contested by the parties.

1.1 Disclosure of E1

E1 discloses a cold-rolling mill ("Kaltwalzgerüst", claim 9) for rolling a steel strip (paragraph 78) with embodiments of widths of 1,200 mm and 1,500 mm (paragraph 70, "Breite 4" and "Breite 5"; Table 1; Figures 1 to 3), the mill comprising:

- a pair of upper and lower work rolls ("Arbeitswalzen" 2);
- a pair of upper and lower intermediate rolls ("Zwischenwalzen" 3) supporting the work rolls, respectively;
- a pair of upper and lower buck-up rolls ("Verstärkungswalzen" 4) supporting the intermediate rolls, respectively (paragraphs 50 and 51; Figure 4);
- an axial direction roll shifting device for each of the intermediate rolls ("Walzenverschiebevorrichtung"; paragraph 54; Figure 6); and
- bending devices for each of the work rolls and the intermediate rolls ("Steigerungsbiegevorrichtung" 10a, 11a, "Verringerungsbiegevorrichtung" 10b, 11b; paragraph 53; Figure 5).

This is common ground between the parties.

1.2 The parties' dispute resides in whether E1 discloses the following features of claim 1 **in combination**:

(a) a cold-rolling mill for rolling a steel strip of minimum width not less than 600 mm and maximum width not less than 1,500 mm but not greater than 1,900 mm;

(b) the work rolls each have a diameter not less than 300 mm but not greater than 400 mm; and

(c) the intermediate rolls each have a diameter not less than 560 mm but not greater than 690 mm.

1.2.1 Regarding feature (a), the board agrees with the respondent that this feature relates to the suitability

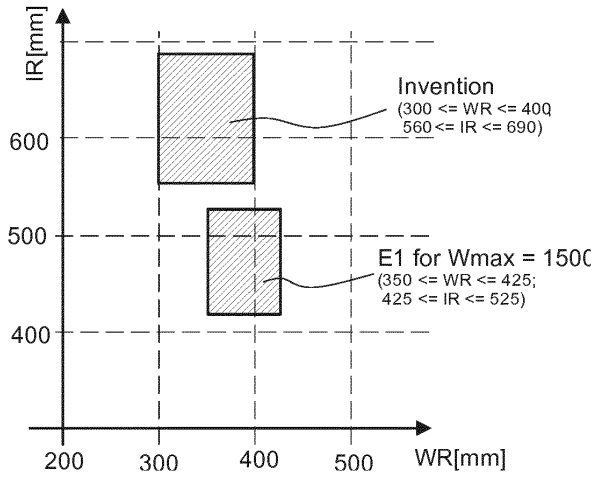
of the claimed cold-rolling mill for rolling steel strips in the claimed width range. In view of Figures 1 to 3, it appears that the cold-rolling mill disclosed in E1 would be suitable for rolling the claimed widths.

Further, E1, paragraph 70, Table 1, discloses embodiments of strip widths of 1,200 mm ("Breite 4") and 1,500 mm ("Breite 5"). The value of 1,500 mm corresponds to the claimed low limit of the maximum width and therefore falls within the claimed range.

Although the board agrees with the appellant that the suitability implies certain structural features of the cold-rolling mill must be present, it is considered that the cold-rolling mill of E1 would necessarily comprise these.

Consequently, feature (a) is disclosed in E1.

1.2.2 As shown in the graphical representation below taken from the statement setting out the grounds of appeal, page 5, the embodiment with a strip width of 1,500 mm does not overlap with the combined claimed ranges of roll diameters ("WR" stands for working roll and "IR" for intermediate roll).



Graphical representation for a strip width of 1,500 mm; statement setting out the grounds, page 5

This is also confirmed by the modified Figure 1 of E1, provided by the respondent with its reply, showing that for a maximum width of 1,500 mm the claimed ranges of roll diameters are not simultaneously fulfilled.

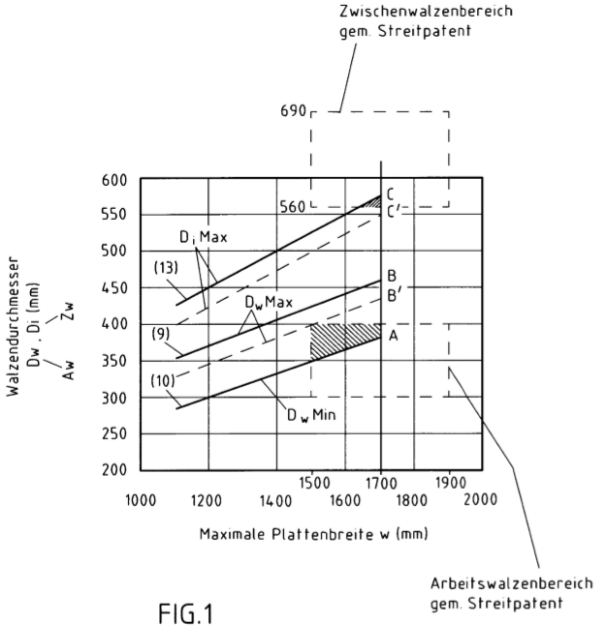


FIG.1

Modified Figure 1 of E1 provided by the respondent

1.2.3 However, contrary to the appellant's view, E1 is not limited to retrofitting 4-high mills into 6-high mills. Thus, it is not appropriate to limit its disclosure to the embodiments of 1,200 or 1,500 mm for the strip width, see paragraphs 7 and 8 and claim 1. In view of Figures 1 to 3, the skilled person would derive that the teaching of E1 also applies to widths greater than 1,500 mm up to approximately 1,700 mm, even if this value is neither mentioned nor singled out.

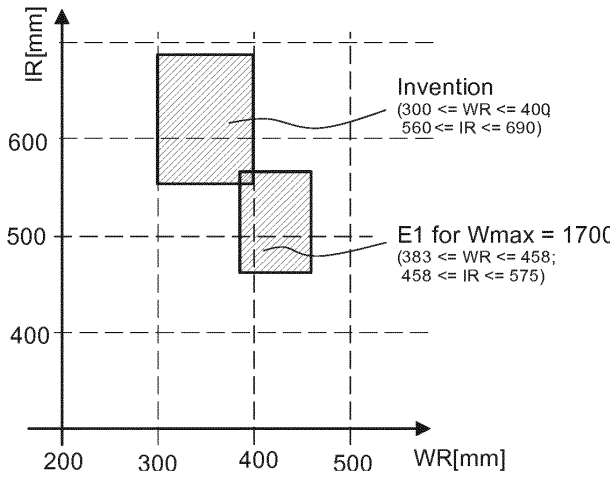
1.2.4 With a value of 1,700 mm for the strip width, equations (9), (10), (13) and (14) of E1, see paragraphs 94 to 102, lead to the following ranges:
- 383 to 458 mm for the work roll diameters; and
- 458 to 575 mm for the intermediate roll diameters.

According to the case law of the Boards of Appeal, the disclosure of a range is considered to be a disclosure of the end values (see Case Law of the Boards of Appeal of the European Patent Office, 9th edition 2019, section I.C.6.3.2, in particular decision T 240/95 of 6 July 1999).

If one were to assume that 383 mm and 575 mm are disclosed in E1 as end values for the work and intermediate roll diameters respectively, the overlap between the disclosed and claimed ranges for a strip width of 1,700 mm would be:
- 383 to 400 mm for the work roll diameters; and
- 560 to 575 mm for the intermediate roll diameters.

This would lead, contrary to the respondent's view, to a narrow area of overlap between the claimed and disclosed areas as derivable from the graphical representation given below taken from the statement

setting out the grounds of appeal, page 8. As a matter of fact the area of overlap consists in: 100 x (17 x 15)/(100 x 130) = around 2% of the disclosed area.



Graphical representation for a strip width of 1,700 mm; statement setting out the grounds, page 8

Moreover, while the selected sub-ranges include the end values of ranges which could be considered to be disclosed in E1, the question of novelty cannot be answered by contemplating the ranges of the overlapping parameters separately. The claimed subject-matter is characterised by **a combination of parameters** resulting from a multiple selection, and must be assessed as such.

Even assuming that 383 mm and 575 mm are disclosed in E1 as end values for the work and intermediate roll diameters respectively, the board does not see any suggestion in E1 for **selecting these precise diameters in combination**. Therefore, contrary to the decision under appeal, it is considered that an embodiment comprising a combination of a work roll diameter of 383

mm and an intermediate roll diameter of 575 mm, is not disclosed or suggested in E1.

There is also no indication in E1 that the skilled person would seriously contemplate working within the area of overlap shown in the graphical representation of page 8 of the statement setting out the grounds (see graphic above).

Furthermore, the respondent failed to point out any embodiment in E1 of combined work roll and intermediate roll diameters which could be considered as close to the claimed combination, i.e. to the area of overlap.

Finally, the contested patent provides convincing reasons for the selection of the combined ranges, see for instance paragraphs 45 to 70 and Figures 4 to 9, i.e. enabling rolling harder high strength steel strips than ever, or at higher reduction ratios for high strength steel strips of the same hardness as before.

1.3 As a consequence, the subject-matter of claim 1 is novel over the disclosure of E1.

Since no other novelty objections have been raised against the subject-matter of claim 1, its subject-matter is considered to be novel over the available prior art documents (Article 54(1) EPC).

2. Inventive step - claim 1 of the patent as granted

2.1 E1 can be considered as the closest prior art for the subject-matter of claim 1 since it also relates to a cold-roll mill (see point 1.1 above). As a result of the above, the ranges specified in features (b) and (c) for the work roll and the intermediate roll diameters

are the only distinguishing features of claim 1 over E1 (see point 1.2 above).

In view of the technical effects associated with said ranges, the objective technical problem to be solved can be seen as to modify the cold-roll mill of E1 so as to enable rolling harder high strength steel strips than ever, or at higher reduction ratios for high strength steel strips of the same hardness as before (contested patent, paragraphs 45 to 70 and Figures 4 to 9).

2.2 There is no suggestion in E1 which would lead the skilled person towards working in the area of overlap between the claimed and disclosed combinations of work roll and intermediate roll diameters, even for a maximum strip width of 1,700 mm. Hence, in view of E1 alone the skilled person faced with said objective technical problem would not arrive at the claimed subject-matter in an obvious manner.

2.3 Furthermore, the reasoning given in the impugned decision (see point 13 of the reasons) regarding the different combinations E1, E2 and E3 with respect to acknowledging inventive step of the then first auxiliary request, which claimed a more restricted range for the work roll diameters (320 to 360 mm), also applies to the range (300 to 400 mm) of granted claim 1.

In particular, none of the documents E2 and E3 provides a hint to the skilled person faced with said objective technical problem for selecting the diameter of the intermediate roll in the claimed range of 560 to 690 mm for a work roll diameter in the range of 300 to 400 mm.

The respondent has not made any submissions with respect to inventive step in the appeal proceedings.

2.4 In view of the above, the subject-matter of claim 1 is inventive over the available prior art (Article 56 EPC).

3. Since apparatus claims 9 and 10 and method claims 11 and 12 of the patent as granted comprise the cold-rolling mill of claim 1, their respective subject-matter is also novel and inventive over the available prior art for the same reasons as those given above for claim 1.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

C. Spira C. Donnelly

Decision electronically authenticated