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File Number: T 18/89 - 3.2.3

Application No.: 81 730 074.2

Publication No.: 0 072 385

Title of invention: Four high mill of paired-roll-crossing type

Classification: B21B 31/16

DECISION
of 25 March 1991

Proprietor of the patent: Mitsubishi Jukogyo Kabushiki Kaisha

Opponent: SMS Schloemann-Siemag AG

Headword:

EPC Article 56

Keyword: "Inventive step affirmed after amendment"

Headnote



Case Number : T 18/89 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 25 March 1991

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(Proprietor of the patent)

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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 10 November 1988 revoking
European patent No. 0 072 385 pursuant to
Article 102(1) EPC.

Composition of the Board :

Chairman : C.T. Wilson
Members : F. Brösamle
L. Mancini

Summary of Facts and Submissions

- I. European patent application No. 81 730 074.2, filed on 17 August 1981 and published on 23 February 1983 under publication No. 0 072 385 was granted on 29 May 1985 with two claims.

- II. The patent was opposed in due time and form on 27 February 1986; the Opponent requested revocation of the patent on the grounds of Article 56 EPC, whereby inter alia the following documents were cited
 - (D1) JP-A-55 153 606
 - (D2) FR-A-1 413 792 and
 - (D3) CH-A-295 443.

- III. By a decision of 10 November 1988 the Opposition Division revoked the patent pursuant to Article 102(1) EPC for reasons of Article 56 EPC in the light of (D1), (D2) and (D3).

- IV. The Proprietor (Appellant) appealed against this decision on 31 December 1988 and paid the appeal fee on the same day. The statement of grounds of appeal was received on 8 March 1989, containing amended Claims 1 and 2. With a telecopy of 9 March 1989 a further set of claims was filed for consideration. It was requested that these two sets of claims be considered and that the patent be confirmed in amended form.

- V. The Opponent (Respondent) contended, however, that in the light of
 - (D4) JP-A-53 12753
 - (D5) US-A-2 961 901 and

(D1) and (D2), no inventive subject-matter could be seen in the two sets of claims submitted by the Appellant.

- VI. In an attempt to clarify the situation the Board set out its provisional opinion of the case in a communication pursuant to Article 110(2) EPC dated 26 June 1990 and proposed a Claim 1 for consideration.

This claim version was opposed by the Respondent, see letter of 13 July 1990, and was adopted by the Appellant, see letter of 27 August 1990.

Claim 1 now reads as follows (clerical errors amended):

"1. A four high mill of a paired-roll-crossing type which comprises a housing (8), an upper and a lower backup roll bearing case (7,7') held within the housing (8), an upper and a lower equalizer beam (21, 21') in contact, respectively, with the uppermost and lowermost surfaces of said backup roll bearing cases (7,7') and made both movable upwardly and downwardly, pairs of work rolls (2,2') and backup rolls (3,3') in four high arrangement, upper and lower work roll chocks (6,6'), roll-crossing means (13a to d) mounted in said housing (8) to turn said work roll chocks and said bearing cases (6,6') and (7,7') about a common vertical axis on the same horizontal plane so that said upper and lower pairs of rolls can cross each other, and means (4,11) for separately setting the left and right roll gaps (E₁, E₂) between said upper and lower work rolls (2,2'), characterized in that there are disposed such equalizer beams (21,21'), respectively, which are horizontally constrained immovable by the inner walls of the housing (8) whereby said bearing cases (7,7') are guided in the moving direction of the steel to be rolled, and in that the roll-crossing means

(13a to d) directly act on the bearing cases (7,7') of the backup rolls (3,3') and via the bearing cases (7,7') indirectly on the chocks (6,6') of the work rolls (2,2')."

This Claim 1 is followed by a dependent claim also filed with letter of 27 August 1990.

VII. Summarising, the Appellant requests that the impugned decision be set aside and the patent be maintained in amended form on the basis of the following documents:

- Claims 1 and 2 of 27 August 1990;
- columns 1 to 4 of 7 September 1990;
- Figures 1 to 3 of 27 August 1990.

The Respondent requests that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. Amendments
 - 2.1 The pre-characterising features of Claim 1 are derived from Claim 1 as originally filed, whereby its characterising features:
 - (a) equalizer beams (21,21') are disposed which are horizontally constrained by the inner walls of the housing (8);
 - (b) the bearing cases (7,7') of the backup rolls (3,3') are guided by the equalizer beams (21,21') in the moving direction of the steel to be rolled;

- (c) the roll crossing means (13a to d) act directly on the bearing cases (7,7') of the backup rolls (3,3'), and
- (d) the roll crossing means (13a to d) via the bearing cases (7,7') act indirectly on the chocks (6,6') of the work rolls (2,2'),

can be derived from the following parts of the documents as originally filed:

- feature (a) from page 7, lines 15-20;
- feature (b) from page 5, line 19 ("held in contact...") and Fig. 1 reference signs "21,21'" and "7,7'";
- feature (c) from page 7, lines 23-25 ("so as to turn") for instance, and from Fig. 3 reference signs "13a to d" and "7,7'", and
- feature (d) from page 7, lines 8-11 and Fig. 1.

Claim 2 corresponds literally to Claim 2 as originally filed.

- 2.2 As a consequence from 2.1 above Claims 1 and 2 are not open to objections under Article 123(2) EPC.
- 2.3 Claim 1 is based on Claim 1 as granted, since all its pre-characterising features can be seen from this granted independent claim.

Features (a) to (d) according to 2.1 above cannot be seen from granted Claim 1. These features - which are clearly contained in the documents as originally filed - further restrict the subject-matter of granted Claim 1 so that the protection conferred is not extended. Claim 1 meets

therefore the requirements of Article 123(3) EPC so that overall Claim 1 is not open to formal objections under Article 123 EPC.

This is also true for Claim 2 which is identical with original and granted Claim 2, so that overall the amendments to the claims are allowable.

- 2.4 The EPC does not prescribe that a claimed feature is disclosed as an essential feature. What is essential is that the subject-matter of a claim for instance drafted during the appeal stage does not extend the protection conferred. As set out above under 2.3 features (a) to (d) of Claim 1 further restrict the claimed four high mill and do not extend the scope of protection of Claim 1.
- 2.5 The Respondent denies that a skilled person could derive feature (b) according to 2.1 from the original application.

To the Board's conviction from Figs. 1 and 3 can clearly be seen that the roll backup bearing cases "7,7'" are in contact with the equalizer beams "21,21'" and that there is a gap between these bearing cases and the housing "8" so that the bearing cases can be moved by the roll crossing means "13a to d". The equalizer beams "21,21'" act as a guiding means for the bearing cases "7,7'" since they prevent that they escape under the workload generated by the rolling process. Due to the fact that the surfaces of contact between "21,21'" and "7,7'" are parallel to the moving direction of the steel to be rolled the bearing cases "7,7'" are guided in the moving direction as set out in feature (b) of Claim 1. For a skilled person it is clear that this feature has to be seen in combination with

the statement contained in the preamble of Claim 1 that the roll-crossing means "13a to d" are mounted in the housing (8) "to turn said ... bearing cases (7,7') about a common vertical axis...", so that Claim 1 contains a correct technical teaching and the objection raised by the Respondent in this respect is not justified, see page 2 of the letter dated 13 July 1990. Concerning the arguments brought forward on page 3 of the above-mentioned letter it is admitted that the term "bearing chocks" should not have been used in 4.1 of the Board's communication dated 26 June 1990, though this term frequently is used in combination with four high rolling mills.

- 2.6 Summarising, the Board is of the opinion that the features of Claim 1 can unambiguously be derived from the originally filed documents if these are interpreted by a skilled person and that the teaching of Claim 1 is clear, Articles 123 and 84 EPC.
3. Nearest prior art document is (D1), from which document the pre-characterising features of Claim 1 are known, Rule 29(1)(a) EPC.
- 3.1 The subject-matter of (D1) is characterised by the existence of box-shaped inner housings "12,12'" which can best be seen from Fig. 3 of (D1). The housings embrace the parts "7,7'" called "Einbaustücke" in the German translation of (D1) so that the cylinders "13" indirectly act on the parts "6,6'" and "7,7'" when the latter should be turned crosswise, see Fig. 2 of (D1). The housings "12,12'" of (D1) are bulky and difficult to machine; between these housings and the parts "7,7'" of (D1) there can be play and the adjustment of the latter can be incorrect. Furthermore, bending movements can arise from the roll-crossing which negatively affect the adjusting screws and setting cylinders.

- 3.2 From the above disadvantages of the known four high mill results the problem of the present invention which can be seen in maintaining the possibility of roll-crossing and facilitating the means counteracting any bending moments on the screws and setting cylinders by their shape and arrangement.
- 3.3 Starting from a four high mill as defined in the pre-characterising clause of Claim 1 the above problem is solved by the characterising features of Claim 1 as set out in 2.1 above as features (a) to (d), Rule 29(1)(b) EPC.
- 3.4 With these features it is achieved that the complicated inner housings of (D1) can be replaced by simple equalizer beams "21,21'". These are constrained immovable by the inner walls of the housing "8" and support the backup roll bearings cases "7,7'" so that these are guided when the rolls are crosswise moved. Due to the replacement of the bulky inner housings of the known four high mill the opening of the housing "8" can be diminished which is of great influence for the production costs of the housing. The claimed solution of the problem of the invention leads to cheaper means for counteracting the bending moments and any detrimental effects on the adjusting screws and setting cylinders are excluded by the provision of the equalizer beams.
4. From points 3. and 3.3 it follows that the subject-matter of Claim 1 is novel so that in this respect no further discussion is necessary, Article 54 EPC.
5. The assessment of inventive step leads to the following result:

- 5.1 From (D1) there appears to be no direct lead to the features (a) to (d) of Claim 1 according to 2.1, since (D1) is completely based on the necessity of inner housings "12,12'" as disclosed in Figs. 5 and 3 of (D1). Even if these housings were omitted from the four high mill of (D1) then the subject-matter of Claim 1 would not be achieved, since then only the feature (c) of Claim 1 would be achieved i.e. the roll-crossing means "13a to d" would directly act on the bearing cases "7,7'" of the backing rolls "3,3'", but no teaching would be given what to do with means for guiding the bearing cases "7,7'" such that no bending moments negatively affect the adjustment screws and setting cylinders.
- 5.2 (D2) is not particularly relevant for the subject-matter of present Claim 1 since no crossing of rolls is taught and equalizer means as forming the fundamental feature of Claim 1 are not foreseen in the known four high mill. The problem to be solved in (D2) is rather to adjust the rolls under load which problem is not at all envisaged in the attacked patent.
- 5.3 Though in the impugned decision it is indirectly stated that (D3) and also (D2) contain equalizer beams, these cannot be found in these documents. From (D3) a flat part on top of part "a¹", see Fig. 2, can be seen, to which the hydraulic cylinder "i" is linked. It is of no relevance whether the Appellant in attempting to draft an acceptable independent claim has mentioned an equalizer beam in the preamble of such a claim, if the document(s) under discussion clearly prove that this feature is non-existent in the prior art.

From (D3) a rolling mill - obviously with only two rolls - is known in which a hydraulic cylinder "i" acts as the means for creating a certain load, whereas pursuant to

Claim 1 adjustment screws are foreseen for setting the roll gap and whereas Claim 1 is restricted to a four high mill. It is moreover doubtful whether (D3) is a document dealing with rolling of metal. What can be seen from (D3) is the possibility of roll-crossing - this feature forming, however, already part of the pre-characterising clause of Claim 1.

5.4 Concerning (D4) the Board is restricted to the disclosure of the figures, for instance to Fig. 1 which appears to show an equalizer beam "6". From Fig. 3 of (D4) it appears that in (D4) no roll-crossing is envisaged, but only an axial adjustment, see arrows in Fig. 1 in combination with the backup rolls "4,4". In addition adjusting screws as prescribed in Claim 1 obviously are not used in the four high mill according to (D4), since only cylinders can be seen from the figures of (D4). Summarising, (D4) deals with problems different from that of the present invention so that it is not clear why a skilled person should consider (D4) and if he did, why he should derive therefrom to make use of an equalizer beam in combination with a four high mill of the type as laid down in (D1). Only by inadmissible hindsight can (D4) be seen as a contribution to the solution of the problem to be solved in the present case.

(D5) was cited to demonstrate that feature (d) of Claim 1 is known i.e. the chocks "6,6" of the work rolls "2,2'" are guided by the bearing cases "7,7'" of the backup rolls "3,3'". This is, however, only one of the features of Claim 1 and no reason can be seen why a skilled person should make use of this feature in combination with a four high mill according to the preamble of Claim 1, since (D5) does not deal with crossing rolls and equalizer beams which have to be foreseen to avoid detrimental effects on the adjustment screws and setting cylinders.

Due to the fact that Claim 1 claims the combination of all its features, Article 69(1) EPC, to the Board's conviction it is not harmful for the inventiveness of the subject-matter of Claim 1, if one or more of its features per se is/are known from the prior art and if a person skilled in the art would not readily combine the documents under discussion.

- 5.5 As demonstrated above the documents (D1) to (D5), whether taken singly or in combination, do not give any hint to a person skilled in the art how to arrive at the subject-matter of Claim 1 so that it must be concluded that the subject-matter of present Claim 1 is based on an inventive step in the meaning of Article 56 EPC.
- 5.6 Claim 1 is therefore valid and can form the basis for maintenance of the patent in amended form, whereby (granted) Claim 2 can be upheld unamended since its validity is supported by valid Claim 1.
6. The description is in accordance with the essential provisions of the EPC. The Appellant has filed amended figures in which reference signs "12,12'" were deleted. In column 3, lines 62-63 these are, however, still mentioned though no longer having a basis. The Board of its own motion has deleted lines 62-63 of column 3, which were obviously erroneously not deleted by the Appellant despite the fact that the Board in his communication dated 26 June 1990 has pointed to that fact, see page 3, first paragraph.

Order

For these reasons, it is decided that:

1. The impugned decision is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form with the following documents:
 - Claims 1 and 2 filed with letter of 27 August 1990, whereby in Claim 1, line 11 "plan" is amended into "plane" and in line 17 "horizontally" is amended into "horizontally";
 - columns 1 to 4 filed with letter of 7 September 1990, whereby in column 3, lines 62-63 are deleted;
 - Figures 1 to 3 filed with letter of 27 August 1990.

The Registrar:



N. Maslin

The Chairman:



C.T. Wilson