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Datasheet for the decision of 5 November 2019

Case Number: T 1690/16 - 3.2.03

Application Number: 06832688.3

Publication Number: 1992426

IPC: B21B45/02

Language of the proceedings: EN

Title of invention:
COOLING APPARATUS FOR HOT ROLLED STEEL BAND AND METHOD OF COOLING THE STEEL BAND

Patent Proprietor:
JFE Steel Corporation

Opponent:
SMS group GmbH

Headword:

Relevant legal provisions:
RPBA Art. 12(4), 13(1), 13(3)
EPC Art. 56

Keyword:
Late-filed evidence - submitted with the statement of grounds of appeal - submitted during oral proceedings - admitted (no)
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 1690/16 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 5 November 2019

Appellant: (Opponent)	SMS group GmbH Eduard-Schloemann-Strasse 4 40237 Düsseldorf (DE)
Representative:	Dammertz, Ulrich Patentanwaltskanzlei Ulrich Dammertz, LL.M. Postfach 10 02 52 47879 Kempen (DE)
Respondent: (Patent Proprietor)	JFE Steel Corporation 2-3, Uchisaiwai-cho 2-chome Chiyoda-ku Tokyo, 100-0011 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 May 2016 rejecting the opposition filed against European patent No. 1992426 pursuant to Article 101(2) EPC**

Composition of the Board:

Chairman	G. Ashley
Members:	R. Baltanás y Jorge
	M. Blasi

Summary of Facts and Submissions

I. European patent No. 1 992 426 (herein referred to as "the patent") relates to a hot strip cooling device and a method for cooling a hot strip.

II. An opposition was filed against the patent, based on Article 100(a) together with Articles 54 and 56 EPC.

III. The opposition division decided to reject the opposition.

IV. The appellant (opponent) filed an appeal against this decision.

V. The appellant requested that the decision under appeal be set aside and the patent be revoked on grounds of Article 100(a) in conjunction with Article 56 EPC.

VI. The respondent (patent proprietor) requested that the appeal be rejected (main request), or that the patent be maintained in amended form according to one of the sets of claims of auxiliary requests 1 to 6 filed with the response to the grounds of appeal.

VII. Both parties requested oral proceedings according to Article 116 EPC should their requests not be granted.

VIII. In a communication accompanying the summons to oral proceedings, pursuant to Articles 15(1) and 17(2) of the Rules of Procedure of the Boards of Appeal (RPBA), the Board gave its preliminary opinion of the case.

IX. Oral proceedings were held on 5 November 2019, at the end of which the Board announced its decision.

X. Claim 1 as granted, including the identification of the characterising features as given by the respondent during the opposition proceedings (in bold), reads as follows:

"A hot-strip cooling device (10) for cooling a hot strip (12) that has been subjected to finish rolling while being conveyed over a run-out table (5), the device comprising:
a plurality of cooling nozzles (15) that are disposed above a steel strip (12) and eject coolant at an ejection angle (θ) tilted toward the upstream side in a steel-strip traveling direction; and purging means (11, 19);

characterized in that

a) the plurality of cooling nozzles (15) eject rod-like flows of coolant; and

b) the purging means (11, 19) is disposed on the upstream side with respect to the cooling nozzles (15) and purges the coolant that has been ejected from the cooling nozzles (15) and resides on the steel strip (12)."

XI. Claim 7 as granted reads as follows:

"A method for cooling a hot strip (12) that has been subjected to finish rolling while being conveyed over a run-out table (5), the method characterized by:

ejecting rod-like flows of coolant toward the upper surface of a steel strip (12) at an angle (θ) tilted toward the upstream side in a steel-strip traveling direction; and

purging the coolant by using purging means (11, 19) disposed on the upstream side with respect to a position where the rod-like flows are ejected."

XII. State of the art

The following documents have been cited, both in the statement of grounds of appeal and during the opposition proceedings:

D1: JP-H-05261423 A
D1a: Patent Abstracts of Japan, JP-H-05261243 A
D2: Berger B. et al: "20-h mill for maximum production and quality", AISE STEEL TECHNOLOGY, Pittsburg, PA, US, Iron and Steel Engineering, vol 69. No. 11, 1 November 1992, pages 25 to 31, ISSN: 0021-1 559
D3: JP-S-62289315 A
D3a: Patent Abstracts of Japan, JP-S-62289315 A

The appellant filed the following further documents with the statement of grounds of appeal:

B1: Catalogue "Die ganze Welt der Düsentechnik". Firma Lechler GmbH & Co. KG (Höhenstraße 24, 7012 Fellbach, Germany)
B1a: Copies of several pages of catalogue B1
B2: Catalogue "Spritzdüsen und Zubehör". Firma Spraying Systems Co. (North Avenue at Schmale Road, Wheaton, Illinois 60187, USA)
B2a: Copies of several pages of catalogue B2
B3: Affidavit from Dr. Roman Dehmel 29 September 2016
B4: Catalogue "Präzisionsdüsen und Zubehör". Lechler GmbH & Co. KG

B4a: Copies of catalogue B4
B5: JP-S-60206516 A
B5a: Patent Abstracts of Japan, JP-S-60206516 A
B5b: Automatic translation of B5

During the oral proceedings before the Board the appellant filed document B6, a Japanese patent document with number JP 2006 035244 A and its machine translation in English.

XIII. The appellant's arguments can be summarised as follows.

(a) Admittance of evidence under Article 12(4) RPBA:

Document B1/B1a is a proof of common general knowledge which discloses information about orientation of nozzles (see figure at top left in page 7.12), an aspect that cannot be found in other documents.
Since the opposition division considered that the knowledge of the skilled person at the priority date was limited to perpendicular arrangements of rod-like flow nozzles, B1 and B1a are particularly relevant to show that this argument is not correct.

Document B2/B2a discloses that the higher the impact force of rod-like flow nozzles, the higher the cooling effect (see second point in blue text box of page 33), which would motivate the skilled person to use such nozzles for cooling.

Document B3 is an affidavit which proves the public availability of B1/B1a, B2/B2a and B4/B4 before the priority date of the contested patent, and also that they are considered to be a reference manual for the skilled person. The person signing the

affidavit (Dr Dehmel) is offered as a witness for confirming the above.

Should B1 to B4a not be admitted into the procedure, the assessment of the common general knowledge of the skilled person would be unduly restricted; thus the documents have a significant influence on the outcome of the proceedings.

Concerning patent document B5, feature a) is the only difference of the claimed subject-matter with regard to its disclosure, thus it is prima facie highly relevant for the assessment of inventive step.

(b) Admittance of evidence under Article 13(1) RPBA:

The Board's decision during the oral proceedings not to admit any of B1 to B5b into the proceedings created a new situation justifying the filing of B6.
B6 was cited in the search report of the patent application and is therefore known to the respondent, who argued extensively about this document in its submissions before the examining division.
The document would also be familiar to the Board, since it is mentioned on page 2 of the notice of opposition.

(c) Inventive step, Article 100(a) and Article 56 EPC:

The claimed subject-matter is obvious when departing from one of D1, D2 or D3.

Considering D1 and D3, the claimed subject-matter differs from either of these in terms of feature a) (rod-like flow nozzles).

Starting from D1 or D3, the technical problem to be solved is optimising the cooling.

The skilled person would have known from common general knowledge to replace the nozzles of either D1 or D3 by nozzles ejecting a rod-like flow of coolant in order to increase the cooling effect, and thus to solve the posed technical problem.
The skilled person was also well-aware at the priority date that such nozzles could be mounted at an angle, enabling the skilled person to mount the nozzles at the claimed orientation.

If the skilled person needed some teaching beyond common general knowledge, it is available in document D2. The passage bridging pages 30 and 31 of D2 discloses that rod-like flow nozzles are known to produce a "uniform heat transfer". The disclosure in figure 14 and the statement in the paragraph bridging pages 30 and 31 that the nozzles ejecting a rod-like flow of coolant are arranged vertically does not mean that the advantages concerning heat transfer could not be achieved when the nozzles are inclined.
The fact that the temperatures shown as an example in D2 are lower than those of a hot strip was not an obstacle for the skilled person, since the cooling methods were identical for metal processing at different temperatures, the only relevant difference being the amount of coolant involved in each case.

The skilled person would thus have modified the nozzles of D1 or D3 after having learnt the advantages of rod-like flow nozzles concerning heat transfer in D2.

It was clear for the skilled person that it was necessary to replace the single, wide nozzle 5 of D1 by a plurality of nozzles in order to cover the whole width of the hot strip.
Furthermore, the metallic belt 4 of D1 would not have represented a problem for such a replacement, since the flow or liquid coming from the nozzle 5 is not impeded by the belt on its way towards the hot strip, hence coolant emitted by rod-like flow nozzles would also impact the hot strip directly.

Concerning D2 as a departure point, the claimed subject-matter merely differs from the embodiment "Conventional Flat Jet Nozzle System" in figure 14 in feature a).
The skilled person would have found in the same document the information needed to solve the problem of optimising cooling: the "Impingement Jet System", which has rod-like flow nozzles, is disclosed as providing "heat removal that is 30% higher than that of the flat-jet system" (page 31, left column, first paragraph). The skilled person would have recognised that this advantage is not limited to the vertical arrangement shown in figure 14, but would also be achieved by replacing the flat jet nozzles of the "Conventional Flat Jet Nozzle System" by rod-like flow nozzles of the "Impingement Jet System", thus arriving at the claimed subject-matter.

XIV. The respondent's arguments can be summarised as follows:

(a) Admittance of evidence under Article 12(4) RPBA:

All late-filed evidence should be disregarded by the Board making use of its discretion under Article 12(4) RPBA.

Document B1 corresponds to late-filed document D4, which was not admitted by the opposition division, and extends beyond its content, D4 being an extract of B1. The appellant had thus at its disposal the whole content of B1 during the opposition phase and could have filed it at that stage, but decided not to do it.
There is no indication in B1 that the figure, top left on page 7.12, suggests replacing the nozzles disclosed in the other documents by rod-like flow nozzles.

Documents B1/B1a, B2/B2a and B4/B4a do not represent common general knowledge, but are merely extracts from the sales catalogue of particular companies.
The documents do not provide any incentive to select rod-like flow nozzles in order to replace the nozzles of other documents by these.

The alleged advantage concerning the cooling effect recited in page 33 of B2/B2a is only shown in combination with a perpendicular arrangement of the solid jet nozzles, as shown in the table at the top of said page.

Document B3 does not establish the common general knowledge at the priority date. It is merely a statement from an employee of a company, who does not represent the "skilled person".

No substantive arguments have been provided by the appellant concerning B4/B4a, thus the document cannot be considered as prima facie highly relevant.

Document B5/B5a/B5b does not disclose more than that disclosed by D1, D2 or D3, and is thus not prima facie highly relevant.

(b) Admittance of evidence under Article 13(1) RPBA:

The appellant has not relied on document B6 at any point during the proceedings before the opposition division or the Board. The attempt to introduce the document on the day of the oral proceedings is thus a procedural abuse and should not be permitted.

(c) Inventive step, Article 100(a) and Article 56 EPC:

Concerning D1, if the nozzle 5 were replaced by nozzles ejecting a rod-like flow of coolant, then the belt 4 would interfere with the flow of coolant.
Document D1 uses a different technique to provide a satisfactory cooling, namely the establishment of a homogeneous flow of coolant between the belt and the steel plate. The function of metallic belt 4 is to ensure the presence of a thin film of coolant on the hot strip. This is achieved by constraining the coolant that impacts the narrow gap between the metallic belt and the hot strip. The flow produced

by the nozzle 5 of D1 is suitable for this, but rod-like flow nozzles would produce a different non-uniform pattern of coolant at that point, which would not be suitable for this purpose.

Nozzles ejecting rod-like flow of coolant were not common general knowledge, let alone their use to improve cooling performance in a hot strip cooling device. Notwithstanding this, even if such nozzles were part of the common general knowledge, no reason can be found to single them out and to modify the prior art with them.

Should D2 be consulted, the last six lines of the right-hand column on page 30 clearly teach away from the invention, since the nozzles are disclosed as being vertically arranged, as opposed to the claimed subject-matter. The skilled person would thus have arranged the rod-like flow nozzles in vertical position, as taught by D2, but not as claimed in claim 1.
Moreover, document D2 concerns a cold rolling mill and not a hot strip cooling device, thus the skilled person would have not considered the information there being relevant for the cooling of a hot strip as in D1.

Concerning D3 as a starting point, the ejection of the coolant in this document takes place at an angle towards the downstream side of the hot strip (see arrows in figures 2 and 3), as opposed to the claimed subject-matter. Furthermore, D3 does not contain any incentive to replace the slit jet nozzles 4 by rod-like nozzles as in claims 1 and 7.

Reasons for the Decision

1. The appeal is admissible. It complies with the requirements pursuant to Articles 106 to 108 and Rule 99 EPC.

2. Admittance of evidence under Article 12(4) RPBA

2.1 Documents B1, B1a, B2, B2a, B3, B4 and B4a

Documents B1, B2 and B4 are general catalogues of nozzles of two companies, B1 and B4 from Lechler GmbH & Co.KG, and B2 from Spraying Systems Co. Documents B1a, B2a and B4a are excerpt copies of the respective catalogues.
Document B3 is an affidavit from Dr R. Dehmel, who states that he used nozzle catalogues from the same company as those of B1/B1a, B2/B2a and B4/B4a when developing projects concerning cooling systems for steel strips.
The appellant offered Dr Dehmel as a witness in connection with the issue of public availability of the catalogues B1, B2 and B4, and the submission that such catalogues are considered to be manuals in the prior art forming part of the common general knowledge of the skilled person.

The catalogue B1 and copies of seven pages thereof forming document B1a relate to document D4. D4 consists of copies of four pages of the same catalogue B1. D4 was filed late in opposition proceedings and was not admitted by the opposition division as prima facie not being relevant, particularly because nozzles producing rod-like jets were already known in the art, e.g. from D2.

Documents B2, B2a, B4 and B4a are similar to B1 and B1a, showing nozzles for producing rod-like jets.

The Board agrees with the respondent in that documents B1/B1a, B2/B2a and B4/B4a could have been filed during the proceedings before the opposition division. There is no reason apparent to the Board, nor has such reason been advanced by the appellant, as to why these documents had not been filed in opposition proceedings. Furthermore, considering B1/B1a at the appeal stage would - at least to the extent that their content had already been presented as document D4 - amount to overturning the opposition division's decision not to admit D4 into the opposition proceedings. The Board has, however, no reason to criticise the opposition division's exercise of their discretion. Finally, the board notes that the documents were filed by the appellant as proof of common general knowledge.
According to the appellant, the concerned documents should prove that at the priority date:

(i) rod-like flow nozzles were available,

(ii) it was known that a larger impact of coolant implies a higher cooling effect, and

(iii) it was known that rod-like flow nozzles could be mounted for working at an angle to the horizontal.

Concerning aspect (i), the Board agrees with the assessment made by the opposition division at point 10.2.1 of the decision and is of the view that at the priority date such nozzles producing a rod-like flow were commercially available and were used for a number

of purposes, even in the cooling of steel strips, as shown in D2 (see figure 14 and its corresponding description).

Concerning aspect (ii), the statement referred to by the appellant in the blue box at the bottom of page 33 of B2/B2a refers to the product "Jet Stabilisator", and not to the rod-like flow nozzles of the previous product disclosed on the same page. In fact, the picture illustrating the use of the "Jet Stabilisator" shows a nozzle which does not eject a rod-like flow. Nevertheless, the skilled person is aware that, when a given volume of coolant is applied in a concentrated manner over an area, the cooling effect at that area is higher than when the same volume of coolant is spread over a wider region.

Finally, concerning aspect (iii), the fact that a nozzle can be mounted at an angle to the horizontal in a given context is also considered by the Board as being part of the common general knowledge.

The Board thus agrees with the appellant that (i) to (iii) were part of the common general knowledge of the skilled person at the priority date.

In view of this, there was no need to consider any of the documents B1, B1a, B2, B2a, B3, B4 and B4a, since their content did no more than provide evidence of what was acknowledged to be the common general knowledge of the skilled person at the priority date. Consequently, it was also not necessary to hear the witness regarding the public availability and role of these catalogues.

2.2 Documents B5, B5a and B5b

2.2.1 The appellant did not provide any justification for the filing of documents B5 (a Japanese patent document) and B5a/B5b (translations of B5 into English) at the appeal stage other than stating during the oral proceedings that it was a reaction to the decision of the opposition division.

The Board cannot see any reason why B5/B5a/B5b could have not been filed during the proceedings before the opposition division. The subject of the proceedings, i.e. the subject-matter of the granted claims, remained the same throughout the opposition procedure, hence the filing cannot be considered to be a reaction to a change in circumstances nor does it address any specific point in the reasoning of the opposition division.

The Board thus considers that B5/B5a/B5b could and should have been filed by the appellant during the proceedings before the opposition division.

2.2.2 Moreover, the appellant acknowledged that the claimed subject-matter differs from B5 in feature a) (see section X. above) in the same way as D1, D2 or D3.

In the Board's view, B5 discloses prima facie the same kind of nozzle as D1, D2 or D3, i.e. a nozzle projecting a flat jet at an angle to a steel strip.

The appellant has not argued which further features of B5 justified that this document may have more of an impact on the final decision than the already available prior art, which seemed to disclose a comparable technical content.

The Board thus considered that documents B5/B5a/B5b were not prima facie relevant for the decision.

2.3 Considering the above aspects, the Board, in exercising its discretion according to Article 12(4) RPBA, decided not to admit documents B1, B1a, B2, B2a, B3, B4, B4a, B5, B5a and B5b into the proceedings.

3. Admittance of evidence under Article 13(1) RPBA

3.1 The appellant filed document B6 - a Japanese patent document and its machine translation into English - during the oral proceedings before the Board, and argued that this was a consequence of the situation created by the decision of the Board not to admit the documents B1 to B5b into the appeal proceedings.

The preliminary opinion issued by the Board as an annex to the summons for oral proceedings included a negative opinion concerning the issue of admittance of documents B1 to B5b (see point 6 of the annex to the summons). A negative decision by the Board was therefore a possibility which could materialise during the oral proceedings. Such a decision does not amount to an unexpected surprise for the appellant which could justify a reaction at this late stage of the proceedings.

3.2 The appellant argued that the Japanese document B6 was cited in the search report issued by the EPO, and that the respondent had commented extensively on it during the proceedings before the examining division and thus was already familiar with the document.

Moreover, the appellant remarked that the document had been mentioned in page 2 of the notice of opposition, and hence the Board would also be familiar with it.

Article 12(1) RPBA defines the factual framework on which the appeal proceedings is to be based, i.e. the notice of appeal, statement of grounds of appeal, written replies filed in due time, communications by the Board and their corresponding replies.

Document B6 thus does not form part of the appeal case on the mere basis that it had been mentioned in the notice of opposition.

The fact that the respondent may have been familiar with the document at the beginning of the examination procedure is of no relevance, since it was not in a position to reply to specific arguments arising from the document at such a late stage in appeal proceedings.
Furthermore the Board itself had not considered B6, since it had not formed part of the appeal proceedings.

3.3 In view of the above, the Board decided not to admit document B6 into the proceedings pursuant to Article 13(1) RPBA.

4. Inventive step, Article 100(a) and Article 56 EPC

4.1 D1 in combination with the common general knowledge of the skilled person, or with D2:

4.1.1 The Board agrees with the parties in that the claimed subject-matter of claims 1 and 7 differs from the disclosure in document D1 only in feature a), i.e. in

the provision of a plurality of rod-like flows of coolant being ejected.

Document D1 discloses a single nozzle 5 extending in a direction perpendicular to the travelling direction of the steel strip 1 and ejecting a flat flow of coolant (see figures 1 and 2).

4.1.2 The technical effect of the differentiating feature is that fresh coolant breaks through the residual coolant on the steel strip (see page 5 of the contested patent, lines 46 to 47).
The corresponding technical problem addressed by the invention can thus be defined as optimising the cooling process, as given in the patent at page 5, line 54.

4.1.3 Combination with common general knowledge:

The appellant argues that the skilled person, when trying to optimise the cooling process of D1, would have resorted to common general knowledge in the field of nozzles and made use of the well-known rod-like flow nozzles, which applied a larger coolant flow and thus provided a higher cooling effect.
According to the appellant, the skilled person would have replaced the longitudinal nozzle 5 of D1 by a plurality of rod-like flow nozzles covering the whole width of the steel strip 1. This was technically straightforward and would have resulted in the claimed invention.

As mentioned above, the Board agrees that, at the priority date, rod-like flow nozzles were readily available, and it was known that a larger impact of coolant leads to a higher cooling effect; it was also known that rod-like flow nozzles could be mounted for

working at an angle to the horizontal (see point 2.1 above).

However, the skilled person had at the priority date a very large assortment of nozzle types at his disposal, the rod-like flow nozzles being just one type among them. There had therefore to be a particular reason to select this type of nozzle.

The appellant argues that the rod-like flow nozzles would have been selected because they apply a larger flow of coolant and would thus provide a higher cooling effect. The Board does not agree with this submission.

Notwithstanding the fact that a rod-like flow nozzle must eject a flow at a minimum speed in order to ensure a stable rod-like flow, the volume of fluid dispensed by such nozzles is not necessarily in all cases greater than that of flat flow nozzles.
The volume applied by a nozzle depends on the pressure of the fluid arriving to the nozzle and on the section of the nozzle opening. Since the dimensions of the nozzle opening and the applied fluid pressure are variable among nozzles, both of the flat flow and of the rod-like flow types, it is not inevitable that all rod-like flow nozzles provide a greater flow rate than any flat flow nozzle.

Nothing in D1 leaves the Board assume that the flow provided by a plurality of rod-like flow nozzles would inevitably be greater than that of nozzle 5.
The only disclosure in D1a concerning the flow applied by nozzle 5 reads: "The cooling water is flowed at a high speed from the nozzle header 5 toward the dewatering roll 6 in a narrow clearance between the upper and lower surfaces formed by the running steel

plate 1 and the metallic belt 4...". The quoted passage cannot help to clarify this point, as it does not allow any comparison with rod-like flow nozzles.

The Board is thus not persuaded that the skilled person would have generally considered that rod-like flow nozzles would always produce a larger flow than the flat flow nozzle 5 of D1, which would lead to the selection of rod-like flow nozzles.

Furthermore, judging from the figures 1 and 2 of D1 and from the short description provided in D1a, the effect of the flat flow nozzle 5 of D1 is that a uniform layer of coolant is applied across the width of the steel strip. Rod-like nozzles would apply the coolant at discrete points across the width of the steel strip 1 of D1, which would have to be taken into account when trying to achieve a uniform distribution of coolant. The modification of D1 as proposed by the appellant would thus have required further considerations by the skilled person which go beyond the mere replacement of nozzle 5 by rod-like nozzles in a straightforward manner.

The Board thus finds that the common general knowledge would not have allowed the skilled person, faced with the problem of optimising the cooling process, to modify the device of D1 such that he could have arrived at the claimed invention.

4.1.4 Combination with D2:

(a) The appellant also argues that the skilled person, when trying to solve the posed technical problem, would have resorted to document D2, which also concerns cooling of steel strips, and would have

learnt that rod-like flow nozzles ("round-jet nozzles" in the wording of D2) provide a "uniform heat transfer" (page 31, first paragraph on the left). The skilled person, seeking to optimise the cooling process, would have replaced the nozzle 5 of D1 by a plurality of the round-jet nozzles disclosed in D2. The angle of nozzle 5 disclosed in D1 (see figure 2) would have been maintained, since the improved heat transfer is not linked to the vertical orientation of the round-jet nozzles shown in figure 14 of D2, but results from the nature of the round-jet nozzle itself.

(b) The respondent argues that the skilled person would not have taken D2 into consideration due to the much lower temperatures of the steel strip which are handled by the devices disclosed in this document (130 to 140°C; see page 30, middle passage in the right-hand column).

The Board considers that the principle behind the cooling system of D2 can be considered as being applicable in the device of D1, since cooling systems in cold and hot rolling in metallurgy work both require application of coolant for reducing the temperature of the metal strip.

The skilled person would thus have taken the disclosure of D2 into consideration when trying to optimise the cooling process of D1.

(c) Document D2 discloses "round-jet nozzles" arranged vertically: see lower part of figure 14 titled "Impingement Jet System" and also the penultimate sentence of page 30 ("., instead of flat-jet

nozzles, the new system uses round-jet nozzles, which are arranged in a vertical position.")

The sentence bridging pages 30 and 31 explains the effect of such an arrangement, namely: "a large number of circular areas with extremely high flow rates are created on the strip".
It is important to remark that the required areas are disclosed in D2 as being circular, something which would not be possible if the nozzles were inclined at an angle to the horizontal.

The next two sentences on page 31 explain that the effect of the disclosed arrangement is "a uniform heat transfer": this is depicted in the graph of figure 15, which compares favourably the heat transfer of a system comprising vertically arranged round-jet nozzles with that of flat jet nozzles.

From these passages of D2, the skilled person would have learnt that the disclosed "new impingement jet system" comprising round-jet nozzles arranged vertically would be advantageous in terms of "uniform heat transfer", and would have concluded that, in order to obtain the advantages disclosed in D2, he should adopt the "new impingement jet system" as it is disclosed in this document.
The skilled person departing from D1 would thus have concluded, after having consulted D2, that the nozzle 5 could be replaced by the vertical round-jet nozzles of D2 in order to obtain the promised advantage.

Nothing in D2 leads the skilled person to conclude that the advantage of a uniform heat transfer could be also obtained by a modified system in which the

round jet nozzles were arranged at an angle to the horizontal, thus not producing the disclosed circular areas.
In order to achieve this, the skilled person would therefore have had to consider a further modification of the system disclosed in D2.

(d) The skilled person would thus not have arrived at the claimed invention when departing from D1, even after consultation of D2.

4.2 D2, embodiment "Conventional Flat Jet Nozzle System", in combination with D2, embodiment "Impingement Jet System":

The embodiment of D2 disclosing a cooling system based on "flat jet nozzles" (see upper part of figure 14 titled "Conventional Flat Jet Nozzle System" and first sentence of the last paragraph in the right-hand column of page 30) discloses the use of flat jet nozzles mounted at an angle to the horizontal (as disclosed by D1).

Since the starting point for the skilled person is analogous to D1 (concerning flat flow nozzles arranged at an angle to the horizontal), and since the teaching of the embodiment "Impingement Jet System" of D2 is the same as that already set out in the context of the previous point (see point 4.1.4), the same conclusion of a presence of inventive step applies (see point 4.1.4.(d) above).

4.3 D3/D3a in combination with D2 or the common general knowledge of the skilled person

4.3.1 D3/D3a discloses a cooling system comprising "slit jet nozzles" 4 which are analogous to the longitudinal nozzles of D1.

The reasoning set out in point 4.1 therefore applies when considering the modification of D3 in the light of D2 or of the common general knowledge of the skilled person.

4.3.2 Moreover, the arrows in figures 1 and 2 of D3 suggest that the movement of the steel strip takes place from right to left, the slit jet nozzles 4 ejecting coolant at an ejection angle tilted toward the downstream side with respect to the cooling nozzles, i.e. in the opposite direction to that defined in claims 1 and 7.

The direct replacement of the slit jet nozzles 4 of D3 by rod-like nozzles as proposed by the appellant would thus not have resulted in the claimed invention, since the ejected flow of coolant would be ejected in the opposite direction.

4.3.3 The skilled person would thus not have arrived at the claimed invention when departing from D3.

5. Conclusion

In view of the above, the Board considers that the ground for opposition according to Article 100(a) EPC in combination with Article 56 EPC does not prejudice the maintenance of the patent, and that the decision of the opposition division to reject the opposition according to Article 101(2) EPC was correct.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Spira G. Ashley

Decision electronically authenticated