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**Datasheet for the decision  
of 14 May 2013**

**Case Number:** T 1463/10 - 3.2.06

**Application Number:** 03780813.6

**Publication Number:** 1575719

**IPC:** B21B 45/08, B05B 1/04

**Language of the proceedings:** EN

**Title of invention:**  
Descaling nozzle

**Patent Proprietor:**  
Kyoritsu Gokin Co., Ltd.  
JFE Steel Corporation

**Opponent:**  
Lechler GmbH

**Headword:**  
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**Relevant legal provisions:**  
EPC Art. 123(2)  
RPBA Art. 13(1)

**Relevant legal provisions (EPC 1973):**  
EPC Art. 54(2), 56

**Keyword:**  
"Late-filed argument - amendments after arrangement of oral proceedings"  
"Amendments - added subject-matter (no)"  
"Inventive step (yes)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 1463/10 - 3.2.06

**DECISION**  
of the Technical Board of Appeal 3.2.06  
of 14 May 2013

**Appellant:** Kyoritsu Gokin Co., Ltd.  
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**Appellant:** JFE Steel Corporation  
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**Respondent:** Lechler GmbH  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted 27 April 2010  
revoking European patent No. 1575719 pursuant  
to Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman:** W. Sekretaruk  
**Members:** M. Hannam  
T. Rosenblatt

## Summary of Facts and Submissions

- I. An appeal was filed by the proprietor against the decision of the opposition division revoking European Patent No. 1 575 719 due to the subject matter of claim 1 according to a main request lacking an inventive step. In its decision the opposition division also found a prior use D9 to be insufficiently proven. The appellant requested that the decision of the opposition division be set aside and that the patent be maintained according to the main request before the opposition division.
- II. The respondent (opponent) requested that the appeal be dismissed, arguing that claim 1 still lacked an inventive step.
- III. The following documents are mentioned in this decision:
- D2: DE-U-297 06 863  
D3: US-A-3 101 906.
- IV. The Board issued a summons to oral proceedings including a communication containing its provisional opinion, in which it indicated *inter alia* that amended claim 1 appeared to extend beyond the content of the application as originally filed and that claim 1 appeared to lack an inventive step in view of D2 in combination with the general knowledge of the skilled person.
- V. In response to the summons, the respondent presented arguments as to why the prior use D9 should be regarded as proven.

VI. Oral proceedings were held before the Board on 14 May 2013, during which the respondent requested that the appeal be dismissed. The appellant requested that the decision under appeal be set aside and the European patent be maintained with the following documents:  
claims 1-9 of 14 May 2013;  
description pages 3,7,9,11 of 14 May 2013;  
description pages 2,4,5,6,8,10 as granted;  
drawing Figures 1-14 as granted.

VII. Claim 1 on which the decision is based reads as follows:

"A descaling nozzle (1) for removing scale from a steel plate surface by discharging water from a nozzle (1), wherein the nozzle (1) has a nozzle orifice comprising: a discharge orifice (15,25) opening at a concave surface or concave area of a front end, a conical tapered segment (16) extending towards the upstream side from said discharge orifice (15, 25), and a large-diameter segment (18) continuing with said tapered segment (16,36), wherein the taper angle  $\theta$  of the tapered segment (16,36) is  $30^\circ$  to  $80^\circ$ ; characterised in that the ratio  $(D_1/D_2)$  of the inner diameter  $D_1$  of the large-diameter segment (18) relative to the minor diameter  $D_2$  of said discharge orifice (15,25) is 3.5 to 6.9."

Claim 8 reads:

"A carbide nozzle tip (12) attachable to a front end of a nozzle (1) recited in claims 1 to 7, which is formed out of cemented carbide, wherein the ratio  $(D_1/D_2)$  of the inner diameter  $D_1$  of the upstream end relative to

the minor diameter  $D_2$  of a discharge orifice (15, 25) of the tip is 3.5 to 6.9, and a conical flow path extending with a taper angle  $\theta$  of 30 to 80° towards the upstream direction from a discharge orifice (15, 25)."

VIII. The arguments of the appellant may be summarised as follows:

Article 123 EPC

The basis for the insertion of the word 'conical' in claim 1 was the last paragraph of page 6 of the PCT publication WO-A-2004/058427 (all further references also refer to this publication). The amended diameter ratio was taken from page 24, line 6, which was a general disclosure of preferred diameter ratios, not specific to any particular embodiment. The added feature regarding the taper angle was taken from page 7, lines 3-5 which, again, was a general disclosure of the invention.

Article 56 EPC

$D_2$  and the knowledge of the skilled person

The closest prior art was represented by the nozzle known from D2 from which the subject matter of claim 1 differed in that:

- a discharge orifice opened at a concave surface or concave area of a front end;
- the taper angle  $\theta$  of the tapered segment was 30° to 80°; and
- the ratio of the inner diameter  $D_1$  of the large-diameter segment relative to the minor diameter  $D_2$  of said discharge orifice was 3.5 to 6.9.

The objective technical problem could be seen as how to improve descaling at low pressures and/or low flow rates.

D2 had the aim of achieving a regular fluid flow upstream of the nozzle and thus provided no hint to the skilled person to adjust the diameter ratios to within a specific range.

The claimed ratio  $D_1/D_2$  affected spray droplet size through achieving a larger average droplet diameter, thus improving descaling performance. The comparative examples in the patent clearly showed this relationship.

Furthermore, the respondent had submitted no evidence that the problem was not solved by claim 1.

D2 and D3

D3 was directed to a completely different problem to that being addressed in the patent. Even if D2 and D3 were to be combined, the different nozzle constructions would make such a combination complicated.

IX. The respondent's arguments may be summarised as follows:

Article 56 EPC

D2 and the knowledge of the skilled person

The taper angle of  $30^\circ$  to  $80^\circ$  was also known from D2 as could be ascertained through measurement from figure 3.

D2 also disclosed a nozzle with the discharge orifice opening at a concave surface such that the sole characterising feature of claim 1 was the diameter ratio range  $D_1/D_2$  from 3.5 to 6.9.

In solving the problem of improving descaling capability of the nozzle with low energy usage, the

skilled person would be aware that reducing the nozzle exit diameter  $D_2$  would increase the jetted fluid velocity and thus descaling performance. It was thus obvious to decrease  $D_2$  relative to  $D_1$  and thus to provide a nozzle with the claimed diameter ratio.

D2 and D3

Regarding D3, Figure 6 represented the diameter  $D_1$  and Figure 10 the diameter  $D_2$  for the nozzle. Measuring these dimensions in the figures provided representative relative diameters since the cross-sectional areas depicted in Figures 6 and 10 were accurately depicted. The measured representative diameters gave a ratio  $D_1/D_2$  of 4.8, clearly falling within the claimed range of 3.5 to 6.9. D2 in combination with D3 thus deprived claim 1 of an inventive step.

D9 and D3

D9 presented an equally good starting point to D2 for combining with D3 and depriving claim 1 of an inventive step. The prior use D9 was proven, particularly since D9a disclosed all relevant part numbers for the nozzle of the prior use, which thus allowed the particular build of the nozzle to be understood. The prior use should thus be considered as prior art.

## **Reasons for the Decision**

### 1. Article 123(2) EPC

The respondent had no objections to the amendments made in claim 1 by the appellant. The Board also finds that the basis for the subject matter of claim 1 is clearly



and unambiguously derivable from the originally filed application documents. The last paragraph on page 6 of the PCT publication of this patent (corresponding to the originally filed application) along with page 7, lines 3-5 and page 24, line 6 disclose the added features of claim 1 in such a manner as to be clearly and unambiguously derivable in combination with the features of claim 1 as originally filed. Claim 1 thus meets the requirement of Article 123(2) EPC.

2. Article 84 EPC 1973

The respondent raised no objections under Article 84 EPC 1973. The Board also sees no need to raise an objection of its own volition.

3. Article 56 EPC 1973

3.1 Claim 1

3.1.1 The parties were in agreement insofar as D2 disclosing a descaling nozzle representing the closest prior art for claim 1. The Board concurs with this view. The parties were furthermore in agreement that the following feature of claim 1 was not known from D2:

- the ratio of the inner diameter  $D_1$  of the large-diameter segment relative to the minor diameter  $D_2$  of said discharge orifice is 3.5 to 6.9.

The appellant argued further that the following features were also not known from D2:

- a discharge orifice opening at a concave surface or concave area of a front end; and

- the taper angle  $\theta$  of the tapered segment is  $30^\circ$  to  $80^\circ$ .

Regarding the discharge orifice opening at a concave surface or concave area of a front end, the Board finds this feature to be clearly disclosed in D2. Figures 1, 3 and 5 each disclose the same nozzle tips (2) which at their discharge orifice (lowest point of nozzle tip, 2, in each of the figures) are shown as being formed in a concave surface at least in the plane of the cross-section depicted. Thus, irrespective of the surface's shape perpendicular to the cross-section (which shape is not defined in D2), such surface can still be regarded as concave at least in the plane of the cross-section. The discharge orifice in D2 thus opens at a concave surface, therefore anticipating this disputed feature of claim 1.

Regarding the taper angle of the tapered segment falling in the range  $30^\circ$  to  $80^\circ$ , the Board finds this feature also to be disclosed in D2. The respondent argued that the taper angle of the tapered segment in D2 could be directly measured from the figures 1, 3 and 5 and gave a measurement of about  $48^\circ$  i.e. falling comfortably within the claimed range. Given the schematic nature of drawings in patent specifications, the Board refers to paragraph [0011] of the opposed patent in which the cited prior art specifically mentions a nozzle with a taper angle of about  $50^\circ$ . The document cited in this paragraph includes a nozzle which, as acknowledged by the appellant, is identical to that disclosed in D2, such that it may be concluded that the taper angle of the nozzle in D2 is equally about  $50^\circ$ . The Board thus concludes, at least for this

latter reason, that the feature of claim 1 regarding the taper angle of the tapered segment falling in the range  $30^\circ$  to  $80^\circ$  to be anticipated by D2.

The Board thus concludes that the sole feature distinguishing claim 1 over the nozzle known from D2 is that the ratio of the inner diameter  $D_1$  of the large-diameter segment relative to the minor diameter  $D_2$  of said discharge orifice is 3.5 to 6.9.

- 3.1.2 When analysing the presence of an inventive step in a claim, it is established practice before the Boards of Appeal to first formulate an objective technical problem based on the technical effect resulting from the distinguishing features of the claim over the closest prior art.

The appellant formulated the objective technical problem as being to improve the descaling performance of the nozzle at a low fluid pressure and/or a low fluid flow rate. In support of its claim that the distinguishing feature of claim 1 achieved the improved descaling performance the appellant referred to the examples and comparative examples provided in paragraphs [0063]-[0071] and table 1 of the patent. Particularly with reference to example 1 and comparative examples 1 and 5, the appellant indicated that the erosion amount for example 1 was about 6 times and about double that for comparative examples 1 and 5 respectively.

With regard to the technical problem formulated by the appellant, the Board finds, however, that this cannot be regarded as truly objective as the distinguishing

features of claim 1 have not been proven by the appellant to clearly result in the claimed technical effect of improved descaling. Whilst the example 1 clearly shows an improved descaling performance compared to comparative examples 1 and 5, the Board has serious doubts that this is achieved solely through the above identified distinguishing feature of claim 1. From a detailed comparison of the physical differences of the nozzles tested in example 1 and comparative examples 1 and 5, it is clear that many more parameters than simply the diameter ratio  $D_1/D_2$  differ between them all (for example: the length of the large diameter segment; and the presence of a taper immediately upstream of the orifice in example 1, yet not in the comparative examples, see figures 2 and 8 of the patent respectively) such that it is not possible to conclude that it is the difference in the ratio  $D_1/D_2$  that is solely responsible for the improved descaling performance. Indeed it would be expected that all physical parameters of the nozzle would affect the flow of fluid therethrough and that, therefore, a combination of individual effects of each changed parameter would combine to provide the overall nozzle flow characteristic and thus nozzle descaling performance.

The Board is thus of the view that, since the distinguishing feature of claim 1 cannot be solely credited with the improved descaling performance, a simpler objective technical problem is appropriate, which the Board formulates as 'providing an alternative to the known descaling nozzle'.

### 3.1.3 D2 and the knowledge of the skilled person

In deciding whether a claim involves an inventive step, the question to be answered is whether there is any teaching in the prior art that would have prompted the skilled person, faced with the objective technical problem, to modify or adapt the closest prior art thereby arriving at something falling within the terms of the claim. When applied to the present case, the question to answer is whether the skilled person, wishing to provide an alternative descaling nozzle, with his general knowledge and in view of the technical teaching of D2, would modify the nozzle known from D2 to include a diameter ratio  $D_1/D_2$  from 3.5 to 6.9.

D2 provides very little detail of the actual nozzle at the tip of the claimed descaling device since it is the provision of an easily manufactured device which achieves a regular fluid flow upstream of the nozzle which lies at the heart of the invention of D2 (see page 2, first full paragraph). There is certainly no hint to selecting a diameter ratio  $D_1/D_2$  in the range 3.5 to 6.9 when wishing to provide an alternative descaling nozzle.

The respondent argued that the skilled person would always wish to improve the descaling effectiveness of a nozzle and, from an understanding of a reduced nozzle diameter producing a fluid jet of greater velocity, would thus consider reducing a nozzle diameter in order to improve descaling as an obvious development of the nozzle known from D2. The Board notes, however, that it is not simply a reduction in nozzle diameter which is defined in claim 1, rather a definition of the diameter

relationship  $D_1/D_2$  from 3.5 to 6.9. Whilst D2 exhibits a diameter ratio  $D_1/D_2$  of about 2.6 and reducing the nozzle exit diameter  $D_2$  would indeed increase the ratio  $D_1/D_2$  towards the claimed range, the skilled person is neither offered guidance in D2 nor would his general knowledge lead him towards specifying both diameters  $D_1$  and  $D_2$  in order to meet the specific range of diameter ratio claimed in the subject matter of claim 1.

The arguments presented thus failed to convince the Board that the subject-matter of claim 1 lacks an inventive step with regard to the combination of D2 with the general knowledge of the skilled person.

#### 3.1.4 D2 and D3

D3 had not been included in the respondent's arguments prior to the oral proceedings and thus involved an amendment to its case. According to Article 13(1) of the Rules of Procedure of the Boards of Appeal (RPBA), any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion. In the present case the Board would admit D3 into the proceedings if the argument based upon the document was *prima facie* more relevant than those already on file.

The respondent argued, with reference to col.4, lines 3-13 and Figures 2, 3 and 6 - 10, that Figure 6 represented the diameter  $D_1$  and Figure 10 the diameter  $D_2$  for the nozzle disclosed in D3. Whilst it was necessary to physically measure these diameters from the figures, this was acceptable since the relative cross-sectional areas in Figures 6 and 10 were stated

in col.4, lines 3-6 and these were consistent with the relative cross-sectional areas calculable from measurement of the figures. The figures were thus drawn accurately to scale. The representative diameters thus gave a ratio  $D_1/D_2$  of 4.8, clearly falling within the claimed range of 3.5 to 6.9. The respondent drew the conclusion that D2 in combination with D3 thus deprived claim 1 of an inventive step.

The Board can accept the appellant's arguments insofar as col.4, lines 3-6 confirming that the nozzle cross-sectional areas shown in Figures 6-10 are accurately drawn. However, this fact does not guide the skilled person to extract information regarding the diameter of the nozzle from these figures. Indeed, the teaching of these figures is solely related to shape and area of the cross-sections depicted; there is no information in D3 which would lead the skilled person to wish to measure the linear dimensions of the cross-sections, let alone extract the teaching that a ratio of  $D_1/D_2$  between the largest and smallest dimensions of Figures 6 and 10 respectively would, when falling in the range 3.5 to 6.9, offer any nozzle performance advantage. With D3 thus failing to disclose the distinguishing feature of claim 1 over D2, it follows that the combination of D2 and D3 cannot render the subject-matter of claim 1 obvious.

It follows, therefore, that the combination of D2 with D3 fails *prima facie* to provide a more convincing argument against the presence of an inventive step in claim 1 than the arguments already on file. D3 and consequently also the amendment to the respondent's case with respect to the inventive step argument based

on a combination of documents D2 and D3, are thus not admitted into the proceedings under Article 13(1) RPBA.

### 3.1.5 D9 and D3

In the response to the appellant's appeal, the respondent had elected not to present further arguments substantiating the prior use D9, restricting itself solely to 'reserving the right' to submit further arguments at a later date. Any arguments submitted subsequently had thus to be considered as a change of case, the admittance of which into the proceedings was at the Board's discretion.

The respondent had, in a submission after the summons to oral proceedings, presented arguments as to why D9 should be considered proven and therefore why it should be considered as prior art under Article 54(2) EPC. At this time, however, no indication was given how the prior use according to D9, if proven, would be used by the respondent in an argument questioning an inventive step in claim 1.

Only at oral proceedings did the respondent for the first time indicate how, if proven to be prior art, D9 would be used in an inventive step attack. Thus both the appellant and the Board were presented at oral proceedings with arguments relating to inventive step in view of D9 for the very first time.

With the respondent having 'reserved the right' to submit further arguments and evidence relating to D9 as early as in its response to the appeal, the Board considers that this amounted to a deliberate



withholding of its complete case. The Board thus concludes that, at least in the interests of procedural economy, the prior use D9 and the attack against the patent based on it are not admitted into the proceedings under Article 13(1) RPBA.

3.1.6 In view of the prior art and the arguments submitted by the respondent, it has not been proven that the subject-matter of claim 1 would be obvious to the skilled person. The subject-matter of claim 1 has thus to be considered as involving an inventive step (Article 56 EPC 1973).

3.2 Claim 8

The respondent raised objections to independent claim 8 neither during the written nor during the oral proceedings. In the absence of any objections from the respondent, the Board also sees no requirement to investigate this of its own volition.

3.3 The description was adapted by the appellant to meet the requirements of the EPC. To this amended description, the respondent raised no objections.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the European patent on the basis of the main request, filed 14 May 2013, containing the following documents:

Claims: 1-9, filed 14 May 2013;  
Description: pages 3,7,9,11 filed 14 May 2013;  
pages 2,4,5,6,8,10 as granted;  
Drawings: Figs. 1-14, as granted.

The Registrar

The Chairman

M. Patin

W. Sekretaruk