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**D E C I S I O N**  
**of 21 August 2002**

**Case Number:** T 0813/99 - 3.2.2

**Application Number:** 92110142.4

**Publication Number:** 0519397

**IPC:** C21B 7/12

**Language of the proceedings:** EN

**Title of invention:**  
Tap hole drilling machine

**Patentee:**  
NIPPON STEEL CORPORATION, et al

**Opponent:**  
PAUL WURTH S.A.

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 100(a), 113(1)  
EPC R. 71a(2)

**Keyword:**  
"Inventive step (no)"  
"Reimbursement of the appeal fee (no); no procedural  
violation; late filed auxiliary request (not considered)"

**Decisions cited:**  
T 0153/85, T 1105/98

**Catchword:**  
-



**Case Number:** T 0813/99 - 3.2.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.2**  
**of 21 August 2002**

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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 14 June 1999  
rejecting the opposition filed against European  
patent No. 0 519 397 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** W. D. Weiß  
**Members:** R. Ries

U. J. Tronser

## Summary of Facts and Submissions

- I. European patent No. 0 519 397 was granted on 9 October 1996 on the basis of European patent application No. 92 110 142.4.
- II. The granted patent was opposed by the present appellant on the ground that its subject-matter did not involve an inventive step (Article 100(a) EPC).
- III. With its decision posted on 14 June 1999, the opposition division held that the ground of opposition mentioned in Article 100 did not prejudice the maintenance of the patent unamended and rejected the opposition pursuant to Article 102(2) EPC.
- IV. An appeal against this decision was filed by the opponent on 18 August 1999. The appeal fee was paid on the same date and the written statement setting out the grounds of appeal was submitted within the time limit set under Article 108 EPC.
- V. Of the pre-published documents relied upon at the appeal stage only the following were still discussed:
- D1: US-A-4 497 379 equivalent to D1 EP-B-0 052 248
- E8: Prospectus Paul Wurth S.A., Luxembourg, Compact tap-hole guns and drills, 6 pages, PW 2000, 4.85 Print Service
- E10: Affidavit B (Eidesstattliche Versicherung) of Mr Guy Thillen dated 22 April 1999
- VI. In the official communication annexed to the summons to

attend oral proceedings, the Board expressed its provisional opinion that protecting heat sensitive equipment from being adversely affected or even damaged by radiation and/or splashes emanating from the liquid iron could be regarded necessary or indispensable when operating the equipment in the harsh environment of the blast furnace.

VII. With its letter dated 19 August 2002, the opponent (appellant) informed the Board that it would not attend the oral proceedings.

VIII. At the end of the oral proceedings held before the Board on 21 August 2002 in the absence of the opponent (appellant), the requests were as follows:

- The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked and that the appeal fee be reimbursed.
- The respondents (patentees) requested
  - that the appeal be dismissed and the patent be maintained in its entirety (main request), or
  - that the patent be maintained in amended form on the basis of claims 1 to 12 submitted at the oral proceedings as auxiliary request 1, or
  - on the basis of claims 1 to 12 submitted at the oral proceedings as auxiliary request 2.

Claim 1 of the main request reads as follows:

"1. A tap hole drilling machine, which comprises a tap hole drilling machine body for drilling a tap hole at a blast furnace wall by giving impacts and revolutions to a drill rod (1) supported by a drifter (2) while

advancing the drifter (2) along a guide channel (6) by a feed motor (7) provided at the rear end of the guide channel (6), wherein the drifter (2) is an oil hydraulic drifter (2) that produces the impacts and the revolutions by oil hydraulic driving, an oil hydraulic unit (25) as a driving source is provided at a position far from the tap hole drilling machine, the oil hydraulic unit (25) and the oil hydraulic drifter (2) are connected to each other through an oil hydraulic piping (30), and the oil hydraulic drifter is enclosed with a heat resistant cover (43), the heat resistant cover being provided with a heat preventing unit (45, 46) for forcedly cooling the inside of the heat resistant cover (43)."

Compared with claim 1 as granted, claim 1 of the first auxiliary request further includes the wording (in bold letters):

"1. A tap hole drilling machine...by forcedly cooling the inside of the heat resistant cover (43) **by air blowing from air blowing off holes (46).**"

IX. The appellant in its written statements argued as follows:

Hydraulically actuated taphole drilling machines are known in the art, e.g. from document D1. However, this document is exclusively concerned with overcoming the problem of safety hazards associated with the flexible hydraulic hoses rather than with the protection of the hydraulic drifter per se. The flexible hoses frequently hang over the liquid iron and are thus exposed to and damaged by the extreme heat radiation. D1 therefore advocates the use of modular elements in replacement

for the flexible hoses. Nothing is, however, disclosed in D1 which could support the conclusion in the decision under appeal that the modular joint system proposed in D1 is actually less sensitive to heat and therefore makes any further heat protecting or cooling measures superfluous. On the contrary, if a person skilled in this field of technology is faced with the problem of making a hydraulic drilling machine highly resistant to radiation heat, splashes and dust, so that it will not be damaged by the thermal load and harsh conditions encountered at the taphole of a blast furnace, he will provide an effective protection by surrounding the hydraulic drifter with a water or air cooled heat resistant cover. This solution is all the more close at hand since the corresponding tool, the hydraulically actuated clay gun which is operated in the same harsh environment of the blast furnace to plug the taphole, already comprises a water or air cooled thermal shield at its underside between the liquid iron and the gun. Hence it would need no imagination to the metallurgical engineer also to protect the hydraulic drifter effectively from heat in the same way. The subject-matter of claim 1 therefore lacks inventive step.

This position about inventive step which was initially adopted by the Opposition Division in its provisional opinion in its official communication, was surprisingly reversed at the oral proceedings. Even more importantly, since the Opposition Division did not even give any hint concerning the possible reasons for this surprising change at the oral proceedings, the opposing party was deprived of any possibility for presenting counter-arguments. Acting in this way entails a violation of Article 113(1) EPC ie the right to comment

before a decision is taken. Reimbursement of the appeal fee is, therefore, requested.

X. The respondents argued as follows:

Document D1 discloses a rotatable modular joint system and components thereof which are suited to be used in the proximity of the blast furnace for delivering a pressurized hydraulic fluid to the hydraulically operated taphole drill. However, document D1 fails to mention any means for protecting the hydraulic drifter against radiation heat, iron splashes and dust so that it can be used safely for a longer time in the severe environment of the blast furnace. Consequently, this document cannot suggest any technical means to solve the problem underlying the disputed patent. As set out in claim 1, the patent proposes to provide the hydraulic drifter with a heat resistant cover that is forcedly cooled at the inside of the cover. The forced cooling air is blown through blow holes in the heat resistant cover to cool the radiation heat transmitted through the cover and further prevents the intrusion of high temperature gases and dust into the cover. Even if an inflammable hydraulic fluid is used, the heat resistant cover protects the high power hydraulic drifter so that the tapholes can be securely drilled through the hard refractories plugging the taphole. By providing the hydraulic drifter with the claimed heat resistant cover, it is possible for the first time to use a hydraulic drifter as a taphole drill in replacement for the conventionally used pneumatic drifter. Thus, the opposed patent represents a pioneer invention which clearly involves an inventive step.

Moreover and contrary to the opponent's allegations, a



hydraulic drifter is a working tool quite different from the hydraulic cylinder of a clay gun which has a low working speed and a rather rough clearance precision between the cylinder and the piston. As opposed to the mud gun, the hydraulic drifter operates at a very high working speed (about 3000 bits/min) and a high precision is necessary to prevent the leakage of the hydraulic fluid from the cylinder and the piston. Since no technical interrelationship exists between the mud gun and the drifter, the heat preventing unit used for the mud gun is not comparable with the heat preventing unit stipulated in claim 1 of the patent which provides forcedly cooling the inside of the heat resistant cover.

The appellant's submissions under Article 113(1) EPC are unjustified. The fact that document D1 proposes an alternative solution to a problem similar to that underlying the opposed patent was amply discussed in the patentee's letter dated 27 April 1999, page 3. Hence the reasons on which the decision of the opposition division are based have been known to the appellant. The appellant's statement that both the opponent and the patentees were surprised by the opposition division's decision announced at end of the oral proceedings is, therefore, without any basis.

## **Reasons for the Decisions**

1. The opponent's appeal is admissible.
2. *Main request of the respondents (patentees);  
Article 123(2),(3) EPC*

Claims 1 to 12 according to the main request correspond to the claims as granted. Hence, there are no formal objections to these claims under Article 123 EPC.

3. *The closest prior art*

For deciding whether or not a claimed invention meets the requirement of inventive step, the "problem-solution approach" is applied. This approach consists essentially in (a) identifying the closest prior art, (b) assessing the technical distinction (or effects achieved by the claimed invention) between the claimed subject-matter and the closest state of the art established, (c) defining the technical problem to be solved as the object of the invention to achieve these effects, and (d) examining whether or not a skilled person starting from the closest prior art **would** arrive at a solution falling within claim 1 either by following the suggestions made in the prior art or by resorting to the expert's general technical background knowledge.

The patent under consideration relates to a taphole drilling machine used to drill a taphole through the refractory material of the iron notch in order to cast the hot metal from the blast furnace. After the iron cast has been completed, the hole is plugged again by a mud or clay gun consisting of a hollow cylindrical barrel and a plunger which pushes refractory clay through a nozzle into the taphole. The taphole drilling machine is generally operated pneumatically, but if higher drill power is required, hydraulics are used. The taphole drilling machine according to claim 1 of the patent at issue comprises such a hydraulic drifter which produces the impacts by oil hydraulic driving fed

by a remote oil hydraulic pressure source.

Taphole drilling devices actuated by a hydraulic fluid are referred to in document D1, US-A-4 497 379, which is regarded as representing the closest prior art (cf. D1, column 1, lines 10 to 36). It is also mentioned that the taphole drill is operated in tandem with the clay gun which is always operated hydraulically. According to document D1, it would, therefore, be of advantage to employ the oil hydraulic pressure supply already available for the clay gun also for operating the tap hole drill (cf. D1, column 3, lines 2 to 20). However, document D1 is not specifically concerned with the hydraulic drifter per se (which is described in D1 as being known in the art), but focuses on the problems associated with the employment of the flexible hoses connecting the oil hydraulic supply unit with the drill tool (hydraulic drifter). It was found that the flexible hoses hanging over the spout during the drilling operation are liable to be damaged by the heat and the molten iron splashed thereon when the tap hole is opened, and hence the risk of fire may result from leakage of the hydraulic fluid (cf. D1, column 1, lines 62 to column 2, lines 9). In order to overcome these safety hazards, document D1 proposes multi-path rotatable hydraulic fluid couplings formed from modular elements which may be combined with sets of rigid conduits to define a fluid transmission system which is capable of reliably undergoing complex movements without leakage so that the risk of fire is minimized (cf. D1, column 3, lines 25 to 43).

However, document D1 remains silent about preventing the hydraulic drifter itself from being damaged by heat radiation and splashes emanating from the liquid iron.

4. *Problem and solution*

The skilled person using the taphole drilling machine disclosed in document D1 will soon realise also that the operation of the hydraulic drifter is hampered in the harsh environment of the blast furnace. Therefore, starting from this prior art, the problem underlying the disputed patent consists in providing a high power hydraulic taphole drilling machine which is particularly resistant to the high temperature and radiation heat encountered at the taphole of the blast furnace (see also the patent specification, page 4, lines 53 to 54).

The solution to this problem consists in enclosing the hydraulic drifter with a heat-resistant cover (43) that is provided with heat preventing units (45,46) for forcedly cooling the inside of the heat resistant cover (43).

5. *Inventive step*

This solution is, however, obvious to a person skilled in the art for the following reasons. In the harsh environment of the blast furnace, the risk of adversely affecting the mechanical, hydraulic and electronic equipment as well the working personnel by dust, the extreme radiation heat and splashes emanating from the liquid iron is ubiquitous. Thus, the problem addressed in the disputed patent - and also the countermeasures to cope with it, as shown in the following - are well known to the metallurgical engineer. It goes without saying that any sensitive equipment which is liable to be damaged by the heat needs to be effectively protected for reasons of safety and of cost. Such

protection can be provided in different ways, either simply by attaching a thermal shield between the heat source and the equipment or and, if necessary and more effectively, by forcedly cooling this shield and the equipment itself. In the case of the clay gun which is always operated hydraulically, an effective protection from the extreme radiation heat and iron slashes has already been achieved by a water or air cooled thermal shield located below the gun and the ramming cylinder. As a further safety measure mineral hydraulic oil or phosphate ester which is less inflammable than conventional hydraulic fluid is used. These safety measures are disclosed in document E8, page 4: "A high efficiency equipment: the clay gun, Characteristics and performances". Before the background of document E10, the publication date and the public availability of this document was not contested by the patentee at the oral proceedings. Since the hydraulic drifter is exposed to the same thermal load as the clay gun disclosed in document E8, it is close at hand for the metallurgical expert who is operating the clay gun as well as the taphole drill to protect the hydraulic drifter in the same technically approved manner, ie by providing it with a heat resistant cover and forcedly cooling the cover, albeit by air or, more effectively, by water. But even without any particular reference to document E8, the metallurgist would always be obliged to pay attention to the thermal load to which the drifter is subjected and to take measures for an effective protection against heat, since neglecting such safety measures, ie operating a hydraulic drifter without any heat protecting or cooling, would be prone to provoke hazardous situations. The fact that claim 1 of the disputed patent requires the cooling of the inside of the heat-resistant cover has no bearing on

the matter, since water or air cooling the thermal shield always results in cooling the shield at least in part at its inside. Moreover, in the vicinity of liquid iron, air cooling is far less dangerous compared to water cooling and is, therefore, preferred by the expert. This technical feature therefore cannot make a patentable difference to the well known, generally applied heat protecting measures.

Given this situation the subject-matter of claim 1 of the main request does not involve an inventive step.

6. *First auxiliary request of the respondents (patentees)*

Claim 1 of the first auxiliary request further specifies that the forced cooling of the inside of the heat-resistant cover is done by air blowing from air blowing off-holes. Given that water or air cooled thermal shields are known from document E8 to protect hydraulically actuated tools from heat, the blowing of cooling air through blowing off-holes merely represents a technical solution, the expert will resort to without inventive thinking if such cooling turns out to be necessary. Hence also claim 1 according to the first auxiliary request does not comprise technical features which justify an inventive step.

7. *Second auxiliary request by the respondents (patentees); admissibility*

- 7.1 Compared with the form as granted, claim 1 of the second auxiliary request has been amended by adding "...are connected to each other through an oil hydraulic piping (30) **comprising flexible hoses** and the.... of the heat resistant cover (43) **by air blowing**

**from air blowing off holes (46), whereby the drifter and the flexible hoses (31) are protected."**

7.2 The second auxiliary request is, however, not admitted into the proceedings by the Board for the following reasons.

In the official communication, the Board invited the parties to present any observations on the case at least one month before the oral proceedings, as set out in Rule 71a(2) EPC which equally applies to the Boards of Appeal (see T 1105/98). In the present case, the patentees' auxiliary requests with amended claims were presented during the oral proceedings, ie after the expiry of the time limit set in the summons for oral proceedings. This means that the first and second auxiliary requests, which were submitted at the latest possible date, were filed late.

It is at the discretion of the Board to disregard such requests as out of time, in particular if certain conditions are not met (see T 1105/98, point 3 of the reasons). At such a late stage of the appeal proceedings, at the end of which normally a decision is given and the legal conflict is brought to an end (see Article 11(3) of the Regulations for the Proceedings before the Boards of Appeal saying that after oral proceedings before a Board, the case should be ready for decision), the general principle to apply is that: *the later the requests are filed, the more clearly allowable they must be* (see also T 153/85, points 2.1 and 2.2). Where, as in this case, a decision on the allowability cannot be arrived at the end of the oral proceedings, the claims cannot, by definition, be clearly allowable.

The amendment to claim 1 of the second auxiliary request in addition to the features of claim 6 as granted includes technical features based on the description page 9, lines 54 to 56 (protecting the drifter **and the flexible hoses (31) against surrounding heat**). Thus, the core of the invention has been shifted from the subject-matter included in claims 1 of the main request and first auxiliary request ("protecting (only) the oil hydraulic drifter by enclosing it in a forcedly cooled heat resistant cover") to the subject-matter now included in claim 1 of the second auxiliary request ("protecting the hydraulic drifter and the flexible hoses" in this manner). The protection of both the hydraulic drifter and the flexible hoses featuring now in claim 1 of the second auxiliary request, however, has never been claimed at the appeal proceedings. Given that document D1 is essentially concerned with replacing the flexible hoses by an rotatable modular delivery system, the Board as well as the appellant, at this late stage of the proceedings, are confronted with a situation which calls for additional investigation or even for a new search for a closer prior art which relates to a hydraulic drifter connected by flexible hoses to the power source.

7.3 Given that the Board was not in a position to conclude that the subject-matter of the second auxiliary request in fact met all of the requirements of the EPC, including that of inventive step, the second auxiliary request had to be disregarded.

8. *Reimbursement of the appeal fee*

8.1 According to Rule 67 EPC the reimbursement of the



appeal fee can be ordered only if such reimbursement is equitable by reason of a substantial procedural violation.

8.2 In the present case, the opponent submitted that, at the oral proceedings before the opposition division, he was not informed about the opposition division's position with respect to inventive step that had completely changed vis-à-vis the provisional opinion given in the communication. The reasons for this change being unknown to him, the opponent was not given the opportunity to comment on one of the basic reasons underlying the decision of the opposition division, contrary to the provisions set out in Article 113(1) EPC. However, the opponent's position was contested by the respondents (patentees).

8.3 The Board notes that on page 3, paragraph II, of the official communication, dated 23 November 1998, the opposition division emphasized that a "provisional non-binding opinion on the case, which could be reversed or amended" was given. The official communication further included on page 4, paragraph 4.2 a provisional evaluation of the contents of document D1 as closest prior art, stating that document D1 would be essentially concerned with the problem of providing a reliable technique of simultaneously establishing a plurality of flow paths for a hydraulic fluid from a power source to a hydraulic tool, e.g. a tap hole drill.

Moreover, the technical content of document D1 was also discussed in detail in the patentee's letter of 27 April 1999, page 3, paragraphs 3 and 4. There it was argued that, by replacing the flexible hoses by

multipath fluid rotatable couplings and pipes, D1 suggested an alternative solution to the problem underlying the opposed patent and, consequently, there was no need for further protecting the hydraulic tap hole drilling machine from the harsh environment at the taphole of the blast furnace.

- 8.4 In view of this ample discussion of the contents of document D1, the opponent could, in the Board's view, not have been surprised by the reasoning of the opposition division (see decision page 5, third paragraph) that the modular joint system disclosed by document D1 is regarded as being less sensitive to the high temperatures and the harsh environment at the taphole of a blast furnace and, therefore, represents an alternative solution to the problem addressed by the patent.

Thus, in the present circumstances, the Board concludes that there has been no substantial procedural violation which would justify a reimbursement of the appeal fee.

## **Order**

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

1. The decision under appeal is set aside.
2. The patent No. 0 519 397 is revoked.
3. The request for reimbursement of the appeal fee is rejected.

The Registrar:

The Chairman:

V. Commare

W. D. Weiß