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Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : A supporting and/or protecting structure for a metallurgical installation.

Klassifikation / Classification / Classement : C 21 C 5/46, B 22 D 11/10

ENTSCHEIDUNG / DECISION

vom / of / du 8 November 1989

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent / Titulaire du brevet : Hoogovens Groep B.V.

Einsprechender / Opponent / Opposant : Voest-Alpine Aktiengesellschaft

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 54(2), 56, Rule 58(4)

Schlagwort / Keyword / Mot clé : "Inventive step (yes)"
"Communication under Rule 58(4) EPC - Protest of the Respondent against the decision of the Board not to send a communication."

Leitsatz / Headnote / Sommaire

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 311 /88 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 8 November 1989

Appellant : (Proprietor of the patent)
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Decision under appeal : Decision of Opposition Division of the European Patent Office dated 20 June 1988 revoking European patent No. 95 803 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : G. Szabo
Members : H. Seidenschwarz
L. Mancini

Summary of Facts and Submissions

I. European patent No. 95 803 comprising 13 claims was granted to the Appellant on 30 July 1986 in response to European patent application No. 83 200 719.9 filed on 20 May 1983.

II. An opposition was filed against the European patent requesting that it be revoked due to lack of novelty and inventive step.

The following documents were referred to:

- Drawing CB2-421.1100A dated 15.10.1968 as an evidence of prior use;
- Drawing JS-ADI 0421.1012A dated 27.5.1971 as an evidence of prior use;
- US-A-2 089 026;
- US-A-4 059 397;
- US-A-3 879 167;

and

- DE-A-2 140 666.

III. The Opposition Division revoked the European patent by its decision dated 20 June 1988 on the grounds that the subject-matter of Claim 1 as amended (received on 14 September 1987) did not involve an inventive step in view of the teaching disclosed in US-A-2 089 026.

IV. The Appellant (Proprietor of the patent) lodged an appeal against the decision on 8 July 1988, paying the appeal fee on the same date. The Statement of Grounds was filed on 24 October 1988 with a main and an auxiliary request.

In response to the Communication of the Board of 8 August 1989, the Appellant amended in Claims 1 the wording from "... a plurality of holes (8) in the flange metal spaced from, ..." to "... a plurality of holes (8) in the flange metal close to, but spaced from, ..." (emphasis added).

V. The Respondent (Opponent) contested the patentability of the subject-matter of Claim 1 according to both requests with respect to the teaching known from US-A-2 089 026, DE-A-2 140 666 and the prior communication of the drawing CB2-421.1100A and the delivery of the corresponding vessel, i.e. prior use.

In response to the Communications of the Board of 8 August and 13 September 1989 the Respondent submitted with his letters of 30 August, 26 September and 30 October 1989 documents to prove that the metallurgical vessel according to the above-mentioned drawing has been made available to the public by use before the date of the claimed priority.

VI. An oral proceedings took place on 8 November 1989.

(i) The Appellant disputed the possibility of public access to the drawing submitted by the Respondent and to any vessel installed according to the drawing.

(ii) Furthermore, the Appellant brought forward that the metal flanges 080, 080A at the top of the metallurgical vessel according to the drawing CB2-421.1100A did not extend over a refractory lining which in all probability would be attached to the interior of said vessel. It would be, however, evident to the person skilled in the art that the holes in the metal flange 080, 080A were only used as bore holes

for securing a top ring on the upper surface of the metal flange by bolts extending through said bore holes - as it was shown in Figure 1 of the patent in suit. The purpose of the recesses in the metal flange 100, 100a, 100b at the shoulder of the metallurgical vessel was also not evident from the drawing. Therefore, said drawing did not give any hint to the person skilled in the art which could inspire him to use these holes or recesses as a "heat barrier" across the metal flange extending around an opening of a metallurgical vessel.

(iii) After considering the arguments discussed during the oral proceedings, the Appellant abandoned his earlier requests and submitted a new set of Claims 1 to 11. He argued that the subject-matter of new Claim 1 involved an inventive step with respect to the teaching known from US-A-2 089 026 and DE-A-2 140 666.

(iv) The Respondent set forth concerning the alleged prior use that

- the company receiving the relevant drawing and vessel was part of the public within the meaning of Article 54(2) EPC;

- no seal of confidence concerning the drawing submitted by the Respondent to the recipient had existed between both companies in 1968 and 1969, and

- the vessel installed according to the drawing had been open to the public since 1969.

(v) The Respondent furthermore emphasised that the only difference between the subject-matter of Claim 1 and the metallurgical vessel according to the drawing CB2-421.1100A would be that the metal flange 080, 080A at the top of said vessel did not extend over the not shown, but existing, refractory lining. He did not contest the submission of the Appellant having regard to the function of the holes in said metal flange 080, 080A. However, he added, that the holes in the metal flange 080, 080A even with bolts extending through said holes, as well as the cut-out portions in the metal flange 100, 100a, 100b could be used to restrict heat flow from the inner faces of the metal flanges to their outer faces thus reducing the thermal stress in said flanges.

(vi) Furthermore, the Respondent was of the opinion that it could not be derived as essential to the invention that the holes "extend over the refractory lining" from the application as filed and Claim 1 as granted.

(vii) The Respondent also argued that the subject-matter of the new Claim 1 did not involve an inventive step with respect to

- the general teaching disclosed in DE-A-2 140 666 (page 1, paragraph 4) and its actual embodiments according to the Figures 1 to 3, and

- the embodiment according to Figure 7 of US-A-2 089 026, from which embodiment the subject-matter of new Claim 1 comprising also slot-shaped holes (see dependent Claim 2) differed only in that the open slots are closed.

(viii) The Respondent raised protest against the decision of the Board at the end of the oral proceedings not to send a Communication pursuant to Rule 58(4) EPC.

VII. New Claim 1 reads as follows:

"A supporting and protecting structure for a metallurgical vessel, comprising a metal flange (2,3,16) extending around an opening of said vessel, having an inner periphery directed towards said opening and extending over a refractory lining (6) of the interior of said vessel, characterized in that in order to reduce thermal stresses in the flange (2,3,16) during operation there is a plurality of holes (8) in the flange metal close to, but spaced from the inner periphery extending over part of the flange width and over the refractory lining and distributed circumferentially around the flange whereby heat flow through the flange from the inner periphery to an outer periphery is restricted, wherein the holes (8) are so located relative to the inner periphery (7) of the flange that a relatively flexible beam (11) of flange metal is located between each hole (8) and said inner periphery."

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained in an amended form on the basis of the description and claims as filed during the oral proceedings and the drawings as granted.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. **Amendments**

2.1 Claim 1 comprises a combination of the features mentioned in the Claims 1, 2 and 7 and in the description as well as in the figures as granted.

From the Figures 1 to 3 as well as 5 to 7 it is clear that the holes 8 in the metal flange 2, 3, and 16 extend over the refractory lining. The inclusion of this feature in Claim 1 is, therefore, allowed (following decision T 169/83, Wandelemente/VEREINIGTE METALLWERKE, OJ EPO 1985, 193,).

2.2 There is no formal objection to the current version of Claim 1 including other minor amendments, since this is also adequately supported by the description and figures as filed and represents a restriction in scope. The amendments in the description correspond to the amendments in Claim 1. The dependent Claims 2 to 11 contain the features of the dependent Claims 3 to 6 and 8 to 13 as granted.

The patent, therefore, complies with Article 123(2) and the claims with Article 123(3) EPC.

3. **State of the art**

3.1 From the submissions brought forward by the Respondent with respect to the drawing CB2-421.1100A it clearly results that

- the main purpose of the metal flanges 080, 080A and 100, 100a, 100b is to support the metallurgical vessel for maintaining the circular shape of said vessel, and

- a further purpose of the metal flange 080, 080A is to support a top ring extending over a refractory lining of the interior of said vessel, which top ring is secured by bolts extending through the holes of said flange on the upper surface of this metal flange.

It is evident from these facts that the teaching of the drawing CB2-421.1100A is less relevant for the assessment of the patentability of the subject-matter of Claim 1 than the state of the art known from the documents US-A-2 089 026 and DE-A-2 140 666.

In the exercise of its discretion the Board, therefore, decides not to examine whether the alleged communication of the above drawing and the actual use of the related vessel were made publicly available in the sense of Article 54(2) EPC.

3.2 According to the findings of the Board, the supporting and protecting structure for a vessel known from US-A-2 089 026 is actually the closest prior art with respect to the subject-matter of Claim 1, because this structure is also applicable to high temperature apparatus, where the discharge ends encounter excessive temperature in service.

3.3 The known structure comprises a metal flange (10a), which

- extends around an opening of the vessel and has an inner periphery directed towards said opening and extending over a refractory lining of the interior of the vessel;

- has a plurality of openings in the metal flange (10a) in the form of slots (11a) extending radially from the

inner periphery over part of the flange metal and over the refractory lining and distributed circumferentially around the metal flange.

This construction of the metal flange prevents torsional displacement of the metal flange in either direction without restricting thermal expansion and contraction in the direction of the circumference of the metal flange, so that the said metal flange will be accurately maintained.

Cf. US-A-2 089 026, page 1, left column, lines 1 to 7, 35 to 41, right column, lines 4 to 11; page 2, left column, line 54 to page 3, line 2; Figures 4 to 10.

3.4 The above-mentioned closest prior art teaches the provision of radical slots in the metal flange for the purpose of dissipating distorting stresses (cf. page 2, left column, lines 16 to 19), which slots are open at the inner periphery of the flange. These slots allow the metal flange to expand and/or contract in the direction of the circumference of the metal flange around the opening of the metallurgical vessel. This, however, does not have a direct and intentioned effect on heat flow across the width of the metal flange.

4. The problem and the solution

4.1 It follows from the discussion during the oral proceedings of the prior art known from the above-mentioned documents that the technical problem to be solved by the invention is to improve the structure of the metal flange, so that this metal flange is less susceptible to deformation or cracking resulting from non-uniform temperature of the flange due to hot gases and radiant heat escaping from the metallurgical vessel's opening.

4.2 According to the teaching of Claim 1, this problem is solved by providing a "heat barrier" between the very hot inner periphery and the cooler outer periphery of the metal flange. Consequently, the subject-matter of Claim 1 of the patent in suit differs from the known structure in the sense that

- there are holes close to, but spaced from the inner periphery, over the refractory lining,

- the holes are so located relative to the inner periphery of the flange that a relatively flexible beam of flange metal is located between each hole and said inner periphery.

5. Novelty

None of the documents cited in the proceedings before the European Patent Office discloses a supporting and protecting structure for a metallurgical vessel according to Claim 1. To give reasons in detail is unnecessary since the Respondent did not dispute the novelty with respect to this state of the art.

6. Inventive step

6.1 As regards the possible sources in the art for the above modifications of the closest structure according to US-A-2 089 026, it is also important to consider another cited document, DE-A-2 140 666. This discloses a rightangled lid of steel for a tundish, which lid rests with its outside area upon the walls of the tundish and covers with its central area the liquid steel. This document teaches generally the use of "expansion slots" for the purpose of avoiding deformation and cracking of the lid due to the

thermal stresses resulting from non-uniform heating of the lid by heat radiation (cf. page 1, lines 1 to 25).

6.2 From the actual embodiments shown in the document the person skilled in the art learns to provide

- firstly, extension slots between the outside area and the central area of the lid but not over the refractory lining (cf. Fig. 1), which are parallel to the longitudinal edges of said lid,

- secondly, extension slots around the opening in the central area, which extend radially from this opening, and

- thirdly, links which are located between two expansion slots and connect the central area with the outside area.

When the lid is heated, the expansion slots allow the very hot central area being exposed virtually uniformly to radiant heat from the tundish, to expand more than the cooler outside peripheral area over the lining, whereas the links are buckled thus to compensate for the thermal stresses (cf. page 1, line 28 to page 2, line 16; page 3, lines 4 to 9, 16 to 21; Figures 1 to 3).

6.3 From the above it is clear that the general aims of both US-A-2 089 026 and DE-A-2 140 666 are similar to that of the patent in suit which also embraces vessels and tundishes. The disclosed solutions, however, are based on the concept of "thermal expansion and contraction" alone, whereas the concept of the solution according to Claim 1 is "to restrict the heat flow across the width of the flange" in the area "over the refractory lining".

Therefore, the prior art documents (either per se or in combination with each other) cannot not give any suggestion to provide in the flange metal a "heat barrier" in the form of holes at the suggested location. These holes interrupt the heat flow from the inside to the outside of the metal flange, which reduces in general the heat flow across the width of the whole metal flange. Furthermore, the plastic flow, which the flange metal normally tends to undergo close to the inner face of the metal flange as this flange becomes warmer, and close to the outer face as said flange cools down, is restricted to the space between the holes and the inner face of the metal flange. The permanent deformation of this space due to this restricted plastic flow is further reduced by shaping the flange near the holes, so that a relatively flexible beam is left between each hole and the inner face, not suggested anywhere in the state of the art.

6.4 The restriction in plastic flow and deformation of the flange metal results in the maintenance of the structural strength of the metal flange as a supporting and protecting structure for the metallurgical vessel. This effect, however, would not be achieved if between the radial expansion slots according to US-A-2 089 026, expansion slots parallel to the inner face of the metal flange were to be applied elsewhere according to DE-A-2 140 666. Therefore, an application of the teaching known from DE-A-2 140 666 for positioning extension slots where it seems to be mostly appropriate with respect to the hot area and the cool area in the appropriate location, cannot be construed as a straight-forward application of known teachings.

Consequently, there is no hint in the above-mentioned documents not just to subdivide the inner face of the metal flange or the round opening by radial slots which

allow expansion and contraction of the metal flange or lid, but to provide instead in the inner section of the metal flange or spaced from the edge of the round opening in the lid holes within the meaning of Claim 1, which holes could reduce the heat flow across the metal flange or across the lid in the particular area specified in the claim.

6.5 The other documents cited in the proceedings before the European Patent Office give likewise no hint of the subject-matter of Claim 1. Their teaching could, therefore, neither alone nor in combination with the teachings of the documents discussed in the foregoing paragraphs lead the skilled person to the supporting and protecting structure according to Claim 1.

6.6 The subject-matter of Claim 1 involves also an inventive step within the meaning of Article 56 EPC.

7. Hence, the patent can be maintained with Claim 1 as amended together with the Claims 2 to 11, which are directed to special embodiments of the invention, and with the modified description as well as the drawings as granted.

8. As far as the Respondent's protest against the decision of the Board not to follow the procedure prescribed in Rule 58(4) EPC for informing the parties is concerned, the Board is following the well established jurisprudence of the Boards of Appeal (cf. T 219/83, Zeolithe/BASF, OJ EPO 1986, 211).

The Board has maintained in that case the patent with Claims 1 to 11 as submitted at the oral proceedings, which differ from the claims according to the "Main Request" filed with the Statement of Grounds merely as regards the

combination of Claim 1 and dependent Claim 6. The effect on the scope of the protection conferred by the patent brought about by this amendment in Claim 1 and by the corresponding amendments in the description was easy to perceive, so that the discussion during the oral proceedings was quite sufficient to ensure that the Respondent had adequate opportunity to present his comments. The Respondent gave no indication during the oral proceedings that he needed more time - for instance an interruption of the oral proceedings or even a period in which to present his comments - in order to examine the amendments. Nor did the Board see any such need in that case. The situation is the same in the present case.

Order

For these reasons, it is decided that:

1. The decision of the Opposition Division is set aside.

2. The case is remitted to first instance with the order to maintain the patent in an amended form on the basis of the description and claims filed during the oral proceedings and drawings as granted.

The Registrar: The Chairman:

S. Fabiani G. Szabo

04.12.89

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