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Anmeldenummer / Filing No / N<sup>o</sup> de la demande : 81 301 436.2

Veröffentlichungs-Nr. / Publication No / N<sup>o</sup> de la publication : 0 062 115

Bezeichnung der Erfindung: A fluidised bed catalytic coal gasification  
Title of invention: process  
Titre de l'invention :

Klassifikation / Classification / Classement : C10J 3/54

**ENTSCHEIDUNG / DECISION**  
vom / of / du 29 August 1989

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /  
Titulaire du brevet : Exxon Research and Engineering Company

Einsprechender / Opponent / Opposant : Siemens AG

Stichwort / Headword / Référence : Gasification/Exxon

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (confirmed) - ex post facto analysis"

**Leitsatz / Headnote / Sommaire**

Europäisches  
Patentamt

Beschwerdekammern

European Patent  
Office

Boards of Appeal

Office européen  
des brevets

Chambres de recours



Case Number : T 320 /88

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 29 August 1989

Appellant : Siemens Aktiengesellschaft,  
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Decision under appeal : Decision of the Opposition Division of the  
European Patent Office dated 11 May 1988  
rejecting the opposition filed against European  
patent No. 0 062 115 pursuant to  
Article 102(2) EPC

Composition of the Board :

Chairman : K.J.A. Jahn  
Members : R.W. Andrews  
G.D. Paterson

## Summary of Facts and Submissions

- I. The mention of the grant of the European patent No. 0 062 115 in respect of European patent application No. 81 301 436.2, filed on 2 April 1981, was announced on 31 July 1985 (cf. Bulletin 85/31) on the basis of twelve claims. The only independent claim reads as follows:

"A process for the fluidised bed catalytic gasification of carbonaceous solids which tend to agglomerate and swell at elevated temperatures, which comprises:

- (a) contacting said carbonaceous solids with an aqueous solution containing water-soluble gasification catalyst constituents, thereby impregnating said carbonaceous solids with gasification catalyst constituents;
- (b) oxidizing said catalyst impregnated carbonaceous solids by contacting said solids with an oxygen-containing gas in an oxidation zone at a temperature below 250°C; and
- (c) gasifying said oxidised catalyst impregnated carbonaceous solids at an elevated pressure and temperature in a fluidised bed gasification zone".

- II. A notice of opposition was filed on 25 April 1986 requesting the revocation of the patent on essentially the ground of lack of novelty in the light of the disclosure in DE-A 2 627 325 (1).

- III. By a decision dated 11 May 1988 the Opposition Division rejected the opposition. The Opposition Division concluded that the essential step of oxidising the impregnated

carbonaceous solids was not disclosed in document (1). Therefore, the claimed subject-matter was novel with respect to this document and also with respect to the other cited literature. It was also stated that "Since the Opponent has not contested inventive step ..., there is no reason ... to alter the Examining Division's opinion that the subject-matter of these claims comprises an inventive step".

- IV. An appeal was lodged against this decision on 11 July 1988, with payment of the prescribed fee. A statement of grounds of appeal was filed on 12 September 1988. Oral proceedings, to which both parties were duly summoned, but at which the Respondent was not represented, were held on 29 August 1989.

Although in his statement of grounds of appeal the Appellant still maintained that the process of the patent in suit lacked novelty in the light of the disclosure of document (1) combined with the skilled person's knowledge in the art, at the oral proceedings he conceded that the subject-matter of the disputed patent was novel. However, he argued that the claimed subject-matter did not involve an inventive step in the light of the combined teaching of document (1) and US-A-3 884 649 (5). Thus, document (1) discloses that impregnation of coal which tends to agglomerate and swell at elevated temperatures with gasification catalyst constituents render the coal non-caking and non-swelling. Document (5) teaches that caking coal is converted to a non-caking feed for a gasification reaction zone by pretreating the coal by mild oxidation at temperatures of about 371° to 427°C. Therefore, since both processes give the same beneficial result, it would be obvious to the skilled person to try to combine the oxidation step of document (5) with the catalyst impregnation step of document (1). In view of the use of a

temperature as low as 125°C in the catalyst impregnation step of document (1), and from the viewpoint of the economics of the process, the skilled person would carry out the oxidation step at a temperature as low as possible. This argumentation also applied to the claims in accordance with the six auxiliary requests.

- V. In his written reply to the statement of grounds of appeal, the Respondent argued that in view of the distinction between, on the one hand, the processes of documents (1) and (5), and on the other hand the process of the disputed patent, a combination of the steps disclosed in the two former publications does not suggest the combination of steps which comprise the presently claimed process.
- VI. The Appellant requested that the decision under appeal be set aside and the patent revoked. The Respondent requested that the appeal be dismissed. Alternatively, the Respondent requested that the patent be maintained on the basis of one of six auxiliary requests.
- VII. At the conclusion of the oral proceedings, the decision was announced that the appeal was dismissed.

#### Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.
2. The patent in suit claims a process for the fluidised bed gasification of carbonaceous solids, the tendency of which to agglomerate and swell at elevated temperatures has been substantially reduced by impregnating them with an aqueous solution containing water-soluble catalyst

constituents. Document (1), which may be considered to represent the closest prior art, discloses such a process.

Although this prior art fluidised bed gasification process was considered to be satisfactory when operated at relatively low pressures, it was found that at high pressures the density of the resultant fluidised bed of char particles was very low. These low bed densities result in a substantial reduction in the amount of coal that can be processed in a given gasifier and therefore decreases the amount of product gas that can be produced in the process.

- 2.1 Therefore, in the light of this closest prior art, the technical problem underlying the disputed patent may be seen in providing a process for the fluidised bed gasification of catalyst impregnated carbonaceous solids at elevated pressures in which the density of the fluidised bed is higher than that of the fluidised bed of the known process operating under the same elevated pressure.

According to the patent in suit, the above-defined technical problem is essentially solved by oxidising the catalyst impregnated carbonaceous solids with an oxygen-containing gas in an oxidation zone at a temperature below about 250°C and gasifying the oxidised catalyst impregnated solids at an elevated pressure and temperature in a fluidised bed gasification zone.

- 2.2 In view of the fact that it is clear from the data presented in Figure 3 of the disputed patent that the swelling index as measured in the laboratory by the disclosed method is indicative of the fluidised bed density that is obtained when subjecting the catalyst

impregnated coal to gasification at relatively high pressures, the Board is satisfied that the results shown graphically in Figures 2 and 4 of the disputed patent demonstrate that the technical problem underlying the patent in suit is plausibly solved.

3. The only ground for opposition raised during the opposition proceedings before the Opposition Division against the subject-matter of the granted claims of the disputed patent was that it lacked novelty in the light of the disclosure of document (1).

After examination of the cited document the Board has reached the conclusion that the subject-matter of the claims as granted is novel. Since novelty has been conceded and is no longer in dispute it is not necessary to consider the matter in detail. The Board agrees with the reasoning set out in the decision of the Opposition Division on this point.

- 3.1 The Board also agrees with the statement contained in the Decision of the Opposition Division to the effect that since no allegation of inventive step had been raised by the Opponent there was no need for this question to be considered by it (see the final sentence of paragraph III above).

The function and obligation of the Opposition Division in opposition proceedings is to examine and decide the issues that are raised by the Opponent.

Furthermore, the policy underlying Article 99 and Rule 55 EPC is that the notice of opposition should be filed within the relevant nine months period and should contain at that stage all of the grounds relied upon by the

Opponent (together with an indication of the supporting facts, evidence and arguments).

In the grounds of appeal the Appellant merely stated that he left it to the Board to decide whether the subject-matter of Claim 1 involved an inventive step in the light of the combined teachings of documents (1) and (5). However, during oral proceedings held before the Board, the Appellant put forward substantive arguments in support of lack of inventive step. In the present case, the Board admitted these arguments, since the combination of the disclosures of documents (1) and (5) with regard to the question of inventive step had already been dealt with by the Respondent in his written observations, and since it is clear to the Board that there is little substance in the Appellant's allegation of lack of inventive step. However, the Board confirms that in appropriate cases it may in the exercise of its discretion either refuse to admit such a change of ground at a late stage in the proceedings, or apportion the costs so caused if such is equitable under Article 104 EPC.

4. It thus still remains to be examined whether the requirement of inventive step is met by the claimed subject-matter.

4.1 Document (1) discloses a process for the gasification of carbonaceous solids wherein the solids are heated with an aqueous solution containing at least one coal-conversion cation under elevated pressure at temperatures in the range of 125° to 375°C for a time sufficient to alter the structure of the fuel particles and to impregnate them with at least one cation and subsequently reacting the thus impregnated fuel particles with hydrogen, water, steam, oxygen, air, a carbon oxide or one or more of them at a pressure of at least 10.5 atmospheres and a

temperature of at least approximately equal to the impregnation temperature until most of the fuel particles are converted to synthetic fuel (cf. Claim 1).

Although this document teaches that the impregnation of the coal particles in the manner described reduces coal swelling during the gasification step (cf. the last paragraph on originally numbered page 8), there is no indication in this document that the catalyst impregnation step can be effected at any convenient temperature and pressure or that, in order to solve the problem underlying the disputed patent, the catalyst-impregnated carbonaceous solids should be modified before gasification.

- 4.2 Document (5) discloses a process for the gasification of finely divided carbonaceous material comprising subjecting the feed material to mild oxidation at a temperature of about 371° to 427°C for about 10 to 30 minutes in a fluidised pretreatment zone which is in direct fluid communication with an adjacent gasification zone and in which the thus oxidised particles are converted into fuel gas, oil and tars (cf. Claim 1). Thus, this document teaches that the caking of coal, and, therefore, its agglomeration at elevated temperatures is reduced by subjecting it to mild oxidation under the specified conditions (cf. column 2, lines 8 to 10 and 35 to 39). However, there is no disclosure in this document which would have induced the skilled person, even for economic reasons, to carry out this mild oxidation step at temperatures other than those taught in the document, or which would lead him to consider oxidising at much lower temperatures catalyst impregnated carbonaceous particles rather than untreated particles in order to solve the problem of increasing the density of the fluidised bed at elevated pressures in the subsequent gasification step.

- 4.3 The Appellant's argument that the reference to a temperature of 125°C in document (1) would provide the skilled person with the incentive to oxidise the carbonaceous particles at lower temperatures cannot be accepted since this specific temperature is disclosed in an entirely different context, viz catalyst impregnation and subsequent gasification of the impregnated particles. In view of the clear distinction in the present context between oxidation and gasification, the mention of oxygen and air in document (5) as possible means for bringing about the gasification of the catalyst impregnated particles would not encourage the skilled person to contact catalyst impregnated particles with an oxygen-containing gas at temperatures below 250°C.
- 4.4 In the Board's judgement, the fact that it was known that impregnation of carbonaceous solids with certain cations and mild oxidation of unimpregnated carbonaceous particles at 371° to 427°C both reduce caking and swelling of the material at elevated temperatures would not have provided the skilled person with any indication that the solution to the above-defined technical problem lies in contacting the catalyst impregnated carbonaceous solids with an oxygen-containing gas at temperatures of less than 250°C.
- 4.5 It is the view of the Board that, in lieu of adopting the problem and solution approach for the objective assessment of inventive step, the Appellant, with the benefit of hindsight, has combined the teaching of documents (1) and (5) and tried to demonstrate by ex post facto analysis how the skilled person might have arrived at the claimed process. Apart from alleging that it would have been obvious to try the combination of the teaching of these documents, the Appellant has not given any sound reasons why the skilled person should have done so with any

expectation of solving the technical problem underlying the disputed patent.

5. Therefore, it is concluded that the subject-matter of Claim 1 as granted involves an inventive step. Claims 2 to 12 as granted, which relate to preferred embodiments of the process in accordance with the main claim, derive their patentability from this claim.
6. In view of the above, it is not necessary to consider the Respondent's auxiliary request.

#### Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:



M. Beer

The Chairman:



K. Jahn