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Bezeichnung der Erfindung: Process and burner for the gasification of solid fuel
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : C10J 3/46

ENTSCHEIDUNG / DECISION

vom / of / du 14 December 1987

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.

Einsprechender / Opponent / Opposant : "DUMAG" OHG

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 52, 56, 84

Kennwort / Keyword / Mot clé : "Inventive step (positive) - combination with features known for a different purpose"; "Alleged lack of clarity - no opposition ground"

Leitsatz / Headnote / Sommaire

Case Number : T 325/86

DECISION
of the Technical Board of Appeal 3.3.1
of 14 December 1987

Appellant : (Opponent)	"Dumag" OHG., Dr. techn. Ludwig Kaluza & Co. Schwarzenbergplatz 7 A-1030 Wien
Representative :	Atzwanger, Richard Dipl.Ing. Mariahilfer Strasse 1c A-1060 Wien
Respondent : (Proprietor of the patent)	SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V. Carel van Bylandtlaan 30 NL-2596 HR Den Haag
Representative :	Aalbers, Onno P.O. Box 302 NL-2501 CH The Hague
Decision under appeal :	**Interlocutory decision of the Opposition Division of the European Patent Office dated** 16 July 1986 **concerning maintenance of European patent No.** 0 021 461 **in amended form.**

Composition of the Board :

Chairman : K. Jahn
Members : F. Antony
E. Persson

Summary of Facts and Submissions

I. European patent application No. 80 200 355.8, which had been filed on 17 April 1980 claiming Dutch priority of 13 June 1979, was granted as European patent No. 21 461 on 17 August 1983, with two claims relating, respectively, to a process for the preparation of a gas comprising hydrogen and carbon monoxide by the partial combustion of a finely divided solid fuel with an oxygen-containing gas, and to a burner for carrying out such a process.

II. On 12 May 1984, the Appellant lodged opposition against the patent, requesting its complete revocation for alleged lack of novelty and inventive step over the cited documents

(1) DE-A-1 964 040 and
(2) US-A-3 847 564.

In the course of opposition proceedings, the Patentee (Respondent) submitted amended claims and an adapted introductory part of the description.

III. By their Interlocutory Decision dated 16 July 1986, the Opposition Division held that there were no grounds for opposition to maintenance of the patent as amended. The burner of Claim 2, and accordingly also its use in the process of Claim 1, was not only novel; the subject-matter of both these claims involved an inventive step as well. Both documents (1) and (2) dealt with problems different from the one of the patent-in-suit: (1) with sound generation for the purpose of improved mixing and complete combustion; (2) with the partial combustion of solid fuel finely divided in liquid hydrocarbons, requiring a coolant chamber. The two burner systems being incompatible, it was not obvious to combine their features.

IV. A notice of appeal against the decision of the Opposition Division was filed by the Appellant on 11 September 1986 and the appeal fee was duly paid. A statement of grounds was submitted on 13 November 1986. In the said statement and a further submission made at a later date, the Appellant argued essentially as follows:

(a) Claim 1 did not comply with the requirements of a process claim because it did not refer to a sequence of process steps, but rather to only constructional features as well as to resulting effects (cooling).

(b) Each of the features of both Claim 1 and Claim 2 was known from either document (1) or (2); the novelty was therefore contested.

(c) It was no patentable invention to combine features from two literature references if - as applied to the present case - a skilled person could have easily arrived at such a combination.

The Appellant therefore request that the impugned decision be set aside and the patent be revoked. The initial auxiliary request for oral proceedings has, however, been withdrawn.

V. The Respondent submitted that, in the absence of any new documents or arguments brought forward by the Appellant, the appeal was not well-founded and should be rejected. In response to a Communication from this Board suggesting certain amendments to the claims, he has indicated full agreement, without, however, filing fresh documents. This is considered by the Board to be equal to a request to maintain the patent-in-suit on the basis of the following two claims:

"1. A process for the preparation of a gas comprising hydrogen and carbon monoxide by the partial combustion of a finely divided solid fuel with an oxygen containing gas using a moderator gas, in which process said three components are each separately supplied to an empty reactor space through a burner, through which the solid fuel is passed in a carrier, centrally, leaving the burner with an exactly axial moment, the oxygen-containing gas being passed concentrically around and separately from the fuel stream, leaving the burner with an axially and inwardly directed radial moment, and the moderator gas being passed concentrically around and separately from the oxygen-containing gas, leaving the burner with an axially and an inwardly directed radial moment, the process comprising cooling of the burner, characterised in that the solid fuel is introduced finely divided in a carrier gas, and the cooling of the burner is achieved by the use of a burner, the front part of which is provided with a wall adjoining with its front face the reactor space and having a front face normal to the burner axis, along the inside of said wall there being located the passage for the moderator gas, which passage changes direction at this point, the moderator gas acting as a coolant.

2. A burner for carrying out the process as claimed in Claim 1 which is provided with a central passage (7) for the fuel-containing carrier and concentric passages for oxygen-containing gas (6) and moderator gas (5) around said central passage, outlet openings (10) for the oxygen-containing gas being directed inwardly forward to one point, and one or more outlet openings (17) for the

moderator gas extending mainly parallel with the former openings, characterised in that the burner is further provided with a wall (2) having a front face (14) normal to the centre line (15) of the burner and having also an inwardly directed end (16) which fits loosely in an outlet opening (17) having the form of an annular slot of the connecting wall (9), along the inside of said wall the outlet opening (17) for moderator gas is located, which outlet opening changes direction for cooling of this portion of said wall where said front face is located, the space (5) extending near the burner front along the inside of the front face (14) and said space (5) nevertheless debouching into the space (8) in a direction which is substantially parallel to the bores (10)."

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC; it is thus admissible.

2. As to the formal admissibility of the claims:

2.1. To properly reflect the closest single piece of prior art - viz. (2) -, the preamble of Claim 1 has been amended by the deletion of "gas" after "carrier" in line 7, and the insertion, before "characterised", of the phrase "the process comprising cooling of the burner". This insertion does not extend the protection conferred and is thus in compliance with Article 123(3) EPC. Nor does the said deletion extend the protection when read in conjunction with the further insertion, immediately following the "characterised in that", of the passage "the solid fuel is introduced finely divided in a carrier <u>gas</u> ..." (emphasis added).

Claim 1 as granted and in its present form was and still is limited to the partial combustion of solid fuel in a carrier gas.

2.2. Corresponding deletion of "gas" from the third line of Claim 2 follows as a matter of consistency.

2.3. The further amendments of Claims 1 and 2 - in comparison with the granted version thereof - are either of a merely editorial nature, or they date back to limitations during the first-instance opposition proceedings and are duly supported by the original documents (page 4, lines 21 to 25; page 5, lines 9 to 13; page 5, line 34, to page 6, line 5).

2.4. Thus, there are no formal objections to the present claims.

3. The Appellant's objection that Claim 1 was not a true process claim because it did not relate to a sequence of process steps cannot be accepted. There is no support in the EPC (Art. 84 and Rule 29) for the opinion that a process must be defined in terms of a sequence of several process steps and that it may not be characterized by the mere use of a particular device, such as a burner.

In the present case, the claims are clear and concise, and they are properly supported by the description as required under Art. 84 EPC (which, incidentally, is not even an opposition ground). If the Appellant's attack on the form of Claim 1 should be meant as an objection for lack of clarity, it is not well-founded: following a preamble clearly defining the closest prior art process, the characterizing part then defines, in the framework of such a process, the form in which the solid fuel is introduced ("finely divided in a carrier gas"), and the manner in which the cooling of the burner is achieved, viz. by the use of a burner comprising certain constructional elements. The Board considers this definition perfectly clear.

4. In the Board's opinion, document (2) represents the closest prior art. It relates essentially to a partial-oxidation process for producing gaseous mixtures comprising principally H_2 and CO (abstract, right-hand column, lines 11 to 13), using an apparatus somewhat similar to that of the patent-in-suit (cf. Figure 2). There are employed an oxygen-containing gas and a moderator gas (termed, more specifically, "oxygen" and "steam"), with a liquid hydrocarbon basically serving as carbon source (column 2, lines 5 to 10). However, "slurries of solid carbonaceous fuels in liquid hydrocarbons" are "included by definition" (column 8, lines 38 to 40).

5. The Respondent has considered it a drawback of the process of (2) that a great amount of heat is generated near the burner mouth, which must, therefore, be provided with a coolant chamber through which a coolant is passed. The problem underlying the invention can thus be seen in developing a simplified process, requiring no separate cooling system.

6. The patent-in-suit proposes to solve this problem by the combined features

(A) that the solid fuel is introduced finely divided in a carrier gas, and

(B) that the cooling of the burner is achieved by the use of a burner the front part of which is provided with a wall adjoining with its front face the reactor space and having a front face normal to the burner axis, along the inside of said wall there being located the passage for the moderator gas, which passage changes direction at this point, the moderator gas acting as a coolant.

The Appellant has not challenged the actual solution of the problem by this combination of features, nor does the Board see any reason to do so. The problem, therefore, appears to have been credibly solved.

7. While the Appellant contests the novelty of Claim 1 over (1) and (2), the Board sees no justification for doing so. The fact alone that neither of (1) and (2) discloses a partial oxidation process for a solid fuel in a carrier gas (see (1), page 13, paragraph 1; (2), column 8, lines 26 to 40) is sufficient to demonstrate its novelty over the cited art.

8. The question then arises whether or not either (1) or (2), or these documents combined, rendered it obvious for the skilled person confronted with the above-defined problem to seek a solution thereof by the claimed combination of features.

8.1. Neither (1), nor (2) discloses or in any way suggests that, in order to reduce generation of heat near the burner mouth and to render the coolant chamber of (2) dispensible, it may be useful to subject to the partial combustion a solid fuel finely divided in a carrier gas (see paragraph 5, feature A).

While it can be seen from the discussion of other prior art in the patent-in-suit (column 1, line 16, to column 2, line 43) that this feature is, of course, not per se novel, it can at the same time be seen that by no means does such a choice of fuel overcome all difficulties. In particular,

the passage in column 1, lines 49 to 60, of the description shows that problems of overheating can exist also when solid fuel finely divided in a carrier gas is employed in partial combustion
processes. It was therefore unexpected that such a choice of fuel - in combination with the use of a particular burner; see feature B - could contribute to solving the existing problem.

8.2. As to the choice of the particular burner defined in feature B above, document (2) discloses neither

(B_1) a burner the front part of which is provided with a wall adjoining with its front face the reactor space and having a front face normal to the burner axis,

nor (B_2) the location inside of said wall of a passage for the moderator gas changing direction at this point.

The front part of the burner of (2) as shown in Figure 2 thereof certainly does not have a front face normal to the burner axis; the only thing normal to the burner axis or, expressed differently, "perpendicular to the longitudinal axis of the burner" (column 11, lines 30 to 33) is what is called an "imaginary plane of tangency" through point 54.

It is true that (1) does disclose various forms of burners, including forms in accordance with above features B_1 and B_2 (see particularly Figure 6, in conjunction with page 12, lines 4 et sequ.). However, the devices disclosed in (1) serve the solution of an entirely different problem, viz. most intimate mixing of two or more fluid (i.e. liquid and/or gaseous) media for the purpose of their complete combustion (see page 2, paragraphs 1 and 3; page 9, line 2; page 11, line 8; page 13, paragraph 1); in particular also, the change of direction of the passage for the moderator gas (shown as 84, 85 in Figure 6) serves to create a sound generator (page 3, paragraph 1; page 12, paragraph 3) supporting the fine mixing of the fluids. The skilled person seeking to improve the process of (2) such as to make its separate cooling system dispensible would therefore not be led towards using a burner in accordance with such an embodiment of (1).

8.3. The Appellant's allegation (page 6, penultimate paragraph of their submission dated 10 November 1986) that the burner according to Claim 2 of the patent-in-suit does in fact - like the device of (1) - incorporate a sound generator (even though this is not mentioned in the specification) has neither been supported by appropriate evidence, nor is it otherwise evident to the Board. It must, therefore, be disregarded without going into the question whether, if proven, it would or would not be relevant to the allowability of the patent-in-suit.

8.4. In summary, the combination of features A and B as claimed in Claim 1 does involve an inventive step.

9. Claim 2 of the patent-in-suit is distinguished from (2) by its characterising part, especially by the wall having a front face normal to the centre line of the burner and by the outlet opening for moderator gas changing direction, with the space or passage for the moderator gas nevertheless debouching in a direction substantially parallel to the outlet openings for the oxygen-containing gas. From (1), more particularly from the embodiment shown in Figure 6, Claim 2 is distinguished by the outlet openings for the oxygen-containing and for the moderator gas being directed inwardly forward and again by the space or passage for the moderator gas debouching in a direction substantially parallel to the outlet openings for the

oxygen-containing gas, i.e. inwardly forward. The subject-matter of Claim 2 is thus also novel. As it is based on the same inventive concept as Claim 1, Claim 2 likewise involves an inventive step.

Order

For these reasons, it is decided that:

1. The impugned Decision is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of the two claims set forth in paragraph V of the present Decision and of a description yet to be adapted.

The Registrar: The Chairman:

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