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Aktenzeichen / Case Number / N^o du recours : T 161/88 - 3.2.1

Anmeldenummer / Filing No / N^o de la demande : 84 200 196.8

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 117 003

Bezeichnung der Erfindung: Fluidised bed combustion apparatus

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : F23C 11/02; F23J 3/04; B01J 8/00

ENTSCHEIDUNG / DECISION

vom / of / du 12 September 1989

Anmelder / Applicant / Demandeur : Nederlandse Centrale Organisatie Voor
Toegepast - Natuurwetenschappelijk

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :
Onderzoek

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (no)"

Leitsatz / Headnote / Sommaire

Europäisches
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European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number : T 161/88 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 12 September 1989

Appellant : NEDERLANDSE CENTRALE ORGANISATIE VOOR
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Decision under appeal : Decision of Examining Division 072
of the European Patent Office
dated 28 December 1987 refusing
European patent application
No. 84 200 196.8 pursuant to Article
97(1) EPC

Composition of the Board :

Chairman : F. Gumbel

Members : F. Brösamle

F. Benussi

Summary of Facts and Submissions

- I. European patent application No. 84 200 196.8, filed 14 February 1984 and published on 29 August 1984 under publication No. 0 117 003, was refused by a decision of the Examining Division dated 28 December 1987. The decision was based on Claims 1-9 filed on 23 December 1986 of which Claim 1 reads as follows:

"1. A fluidised bed combustion apparatus in which in the free after-burning zone (6) or the so-called free-board above the bed (5) at least one system (7) of plates or baffles (9,10) inclined with respect to the vertical is arranged so that at least one upwardly directed channel having internally inclined surfaces is formed, such channel, seen in a vertical section in at least one direction, comprising at least one group of two opposed arrays of superimposed inclined parallel plates (9,10), characterized in that of each array of superimposed plates or baffles (9,10) of a channel said plates extend obliquely downwardly from the outside to the inside of the channel and that all plates at least at their outsides are closely connected with the outer boundary (8) of the channel."

- II. The impugned decision cites in substance the documents

D1 "TRANS. INSTN CHEM. ENGRS", Vol. 52, 1974, pages 213-216, by D. Harrison et al: "Suppression of Particle Elutriation from a Fluidised Bed"

D2 US-A-4 242 972

and comes to the conclusion that the subject-matter of Claim 1 lacks an inventive step in view of the prior art disclosed by D1 and D2 and that the dependent Claims 2-9 do not contain inventive subject-matter either.

III. A notice of appeal against this decision was filed on 9 February 1988 and the appeal fee was paid on the same date. The Statement of Grounds of Appeal was filed on 16 March 1988.

The Appellant (Applicant) argues in this statement that the teaching of D2 is partly contradictory to the teaching of Claim 1 since in D2 the baffles are orientated in the wrong direction, that is in the same direction as the gas stream. In the assessment of the Appellant there is no disclosure nor any indication in D2 of increasing the residence time of the particles in the recuperator, on the contrary D2 teaches a separation of the particles and returning the particles back to the burning zone. The teachings of D1 and D2 can therefore not be combined in a manner to arrive at the subject-matter of Claim 1.

IV. In a communication dated 2 December 1988 the Appellant was informed that according to the preliminary view of the Board Claim 1 does not meet the requirements of Article 123(2) EPC since Claim 1 also covers the possibility that a multitude of plates "10" extends from the right without any plates "9" inbetween extending from the left, such an alternative being not covered by the original disclosure.

The Board pointed moreover to

D3 FR-A-2 406 159

and to

D4 US-A-4 161 917

and came to the conclusion that vis-à-vis the disclosure of D3 the subject-matter of Claim 1 does not imply an inventive step taking additionally into account the normal knowledge of a skilled person and the teaching laid down in D4.

- V. In his reply to the above-mentioned communication the Appellant argues that Claim 1 is not broadened by the omission of "at least alternately". To cope with a clarity objection of the Board the Appellant is ready to delete Claim 4.

The Appellant argues in view of D3 that the deflectors are only effective in combination with a portion "70" to form a tortuous passage, so that a multiplication of deflectors per se would not result in any improvement, since the residence time of the particles in the free-board could not be increased. A difference is moreover seen in the way of light particles which following the teaching of D3 would be kept in the bed and would be discharged therefrom, whereas in the apparatus defined in Claim 1 the light particles would be allowed to leave the bed.

The Appellant requested that the impugned decision be set aside and that a patent be granted on the basis of documents underlying the impugned decision (only exception: rewritten page 3 of the description), that is, in particular, with Claims 1-9 filed with letter of 23 December 1986, Claim 4 optionally deleted.

Reasons for the Decision

1. The appeal complies with Articles 106-108 and Rule 64 EPC and is admissible.

2. Concerning the formal admissibility of Claim 1 the following has to be considered:
- 2.1 The words "parallel" and "of the channel", see lines 7 and 10 of Claim 1, are supported by Figures 1-3 as originally filed, so that these modifications of original Claim 1 are acceptable under Article 123(2) EPC.
- 2.2 From Claim 1 as originally filed the words "at least alternately", see lines 10/11, have been omitted in the present Claim 1. This omission leads to a broadening of the independent claim since, from Claim 1, the description and in particular Figures 1-3 as originally filed, it is clear that the plates "9,10" and "9',10'" respectively are arranged alternately, see for instance Figure 2 (seen from top to bottom) where plate "10" extends from the right, plate "9" from the left and so on.

In contrast thereto present Claim 1 also covers the possibility that a multitude of plates "10" extends from the right and, on the same level, from the left without any alternate arrangement of the plates, i.e. with no plates between extending from the left. This alternative is clearly not supported by the original disclosure so that Claim 1 does not meet the requirements of Article 123(2) EPC as already pointed out in the communication dated 2 December 1988, see remark 1.2.

- 2.3 The Appellant with his letter dated 1 February 1989 did not agree with the Board's finding and he raised the argument that the omission of "at least alternately" would lead to a restriction of the independent claim.

The Board cannot share this opinion for the above reasons:

Moreover, it is observed that in the preamble of present Claim 1 it is only stated that two opposed arrays of superimposed inclined plates are foreseen; in the characterising clause of Claim 1 it is prescribed that the plates/baffles extend obliquely downwardly from the outside to the inside of the channel. It is not prescribed however, that the downwardly extending plates/baffles alternate as is clearly shown in Figures 1-3.

The Appellant refers in his letter under discussion to Figure 4, which figure and its corresponding description, however, have been deleted from the application, see letter of 23 December 1986. It is, furthermore, not justified in substance to rely on that disclosure since in the abandoned figure the plates are not only extending obliquely downwardly but as well upwardly, see original page 8, lines 3/4. Present Claim 1 excludes, however, by its wording the existence of plates which extend obliquely upwardly. Additionally, the embodiment of Figure 4 does not comprise plates extending from outer boundary walls forming the vertical channel.

As a result Claim 1 does not meet the requirements of Article 123(2) EPC and the appeal must be dismissed alone for this reason.

3. Moreover, present Claim 1 does not appear to comprise patentable subject-matter.

3.1 Novelty of the claimed subject-matter is clearly given, since the available prior art does not comprise a fluidised bed combustion apparatus with an array of superimposed plates extending downwardly from the outside of the channel to its inside.

Concerning inventive step, the following is observed:

3.2 From D3, see Figures 3 and 10 and page 5, it is known:

A fluidised bed combustion apparatus in which in the free after-burning zone or the so-called free-board (21,71) above the bed (22) at least one system of plates or baffles (72) inclined with respect to the vertical is arranged so that at least one upwardly directed channel (21) having internally inclined surfaces (72) is formed, such channel, seen in a vertical section in at least one direction, comprising at least one group of two opposed inclined plates whereby said plates (72) extend obliquely downwardly from the outside to the inside of the channel (21) and that all plates (72) at least at their outsides are closely connected with the outer boundary of the channel.

3.3 The subject-matter of Claim 1 differs from the apparatus known from D3 by the features that the plates/baffles of each group are superimposed to form arrays of parallel plates/baffles.

3.4 Starting from D3 the objectively remaining problem of the claimed "invention" can only be to enhance the effectiveness of the plates within the channel(s).

3.5 The parameter for defining the effectiveness of the after-burning zone (free-board) is the content of unreacted/unburnt particles in the combustion gases. If by simple tests the person skilled in the art verifies that during operation of the known apparatus (D3) still unreacted/unburnt particles are existent, then it is felt that it lies within his possibilities to modify the free-board until any unreacted particles disappear.

It is moreover clear in the Board's view that the reason for unreacted/unburnt particles is obvious for a person skilled in the art, namely that these particles had no opportunity to react, be it too short a residence time of the particles in the free-board or any other effect.

As a logical consequence of the foregoing it follows that the residence time of the particles in the free-board has to be increased whereby a multiplication of the plates/baffles will primarily be envisaged in this respect by a person skilled in the art, since it can immediately be expected that an increase of obstacles in the form of plates/baffles in the channel for the combustion gases extends the residence time of the particles in the free-board so that more particles have the opportunity to react and to diminish the amount of unreacted/unburnt particles in the combustion gases. By trial and error in the Board's view, a practitioner would be able to modify the known apparatus so that the plates/baffles are arranged as prescribed in Claim 1.

Concerning the necessity of increasing the residence time, D4, column 2, lines 8-14, gives an important hint, since in this document it is disclosed that the residence time has to be increased in the free-board to complete the combustion (after-burning) in that the particles have enough time to completely burn out before they escape from the apparatus. Though in detail D4 relates to a swirling means to increase the residence time of the particles it is obvious for a practitioner that other means can be used for obtaining the same effect, for instance means which diminish the gas velocities or which extend the length of the gas-path through the apparatus, namely by the provision of plates/baffles as claimed in Claim 1. These alternatives are felt to be readily known to a person skilled in the art which is confronted with the problem

how unreacted/unburnt particles can be avoided in fluidised bed combustion apparatus.

3.6 Summarising, the Board comes to the conclusion that it comes within the scope of normal skills and knowledge of a practitioner to conceive the subject-matter of Claim 1 when starting from a known apparatus as disclosed in D3 given the problem of increasing the efficiency of the apparatus. Claim 1 is therefore also not allowable for lack of an inventive step pursuant to Article 56 EPC.

4. The arguments brought forward by the Appellant are not convincing for the following reasons:

The Appellant did not duly consider that D3 discloses more features than are contained in the preamble of Claim 1 and that the starting point of the "invention" when dealing with the question of inventive step is different from that one admitted by the Appellant.

In fact the subject-matter of Claim 1 differs from the apparatus known from D3 only in the feature set out above in remark 3.3. The objectively remaining problem is as a consequence of this fact that one as discussed in remark 3.4. It is shown above that the solution to this problem is obvious.

The Appellant points to the fact that in D3 the deflectors "72" co-operate with a portion "70". As can be seen from D3, the portion "70" is part of the deflector unit "29" and has moreover the task to act as a heat exchanger. The existence of the portion "70" is, however, no restriction to the effectiveness of the deflectors "72" and it appears not justified to contend that the deflectors "72" are only effective in combination with portion "70", since this part has primarily something to do with the heat exchange

and not with the problem how unreacted/unburnt particles can be avoided. All what is necessary is the creation of a tortuous path for the flue-gases containing small particles.

The Appellant further argues that in the claimed apparatus light particles are allowed to leave the bed. This is in principle also the case with the apparatus known from D3 since there it is expressly stated that unburnt particles are prevented from escaping by the tortuous path created by the deflectors and their counterpart 70, see page 5, paragraph 3. Whether or not there is a disclosure in D3 of an increase of the residence time of the particles in the free-board is irrelevant since in the Board's view this phenomenon is well known to a practitioner at least if D4 is considered, where this phenomenon is literally described. The Board is moreover convinced that in the apparatus known from D3 in the free-board a combustion takes place, see reference sign "21" ("chambre de combustion") and its term "combustion chamber", and that particles which are completely burnt in this combustion chamber "21" also leave the free-board in the same way as it is the case with the subject-matter of Claim 1. It is, therefore, not justified to contend that D3 does not teach a two-stage combustion apparatus.

Summarising, the Appellant could not put into doubt that the basic idea of Claim 1, that is a two-stage combustion apparatus with deflectors in the free-board (after-burning zone), is already known from D3 and that a skilled person without exceeding normal practice could modify the known apparatus in a way as defined in Claim 1, in order to reduce the amount of unreacted/unburnt particles in the free-board.

- 5. Since the Board can only decide on the request to grant a patent as a whole, dependent Claims 2 to 9 must fall with the non-allowable Claim-1.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

S. Fabiani

S. Fabiani

The Chairman:

F. Gumbel

F. Gumbel

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