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D E C I S I O N
of 7 October 2002

Case Number: T 0673/99 - 3.2.3

Application Number: 91117594.1

Publication Number: 0481438

IPC: B04C 5/081, B04C 5/28, B01J 8/38

Language of the proceedings: EN

Title of invention:
Centrifugal separator

Patentee:
Foster Wheeler Energia OY

Opponent:
ALSTOM Power Boilers

Headword:
-

Relevant legal provisions:
EPC Art. 56, 100(b)

Keyword:
"Opposition grounds - insufficiency of disclosure (no)"
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-

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Case Number: T 0673/99 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 7 October 2002

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 21 April 1999, posted on 12 May 1999, concerning maintenance of European patent No. 0 481 438 in amended form.**

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
J. P. Seitz

Summary of Facts and Submissions

I. With decision of 12 May 1999 the opposition division maintained European patent No. 0 481 438 in amended form since the requirements of Articles 83, 100(b) EPC and 56, 100(a) EPC were met.

II. Against the above decision of the opposition division the opponent - appellant in the following - lodged an appeal on 5 July 1999 paying the fee on the same day and filing the statement of grounds of appeal on 8 September 1999. The appellant argued that a skilled person was not in a position to carry out the claimed invention and that the claimed subject-matter has to be considered as obvious in the light of

(D1) EP-A-0 205 718

(D2) WO-A-87/05826 and

(D5) GB-A-2 108 409.

III. Following the board's Communication pursuant to Article 11(2) RPBA in which the board gave its provisional opinion with respect to the issues of Article 100(b) and 100(a) EPC oral proceedings were held on 3 July 2002 in which the patentee - respondent in the following - submitted claims 1 to 21 according to the **main request**.

IX. The independent claims 1 and 18 thereof read as follows:

"1. Fluidized bed reactor having a reactor chamber (10) and a centrifugal separator (12) for

separating particles from hot gases, said separator comprising

- at least two adjacently and parallel disposed vertical vortex chambers each having walls (32, 34, 36, 38) defining an interior gas space, an upper section (43), and a bottom section (45);
- at least one inlet (30) for gases to be purified, disposed in the upper section in a side wall (32) of each vortex chamber, said inlet being in flow connection with the reaction chamber (10);
- at least one outlet (50, 52) for the purified gases, from each of said vortex chambers; and
- at least one outlet (46) for the separated particles, disposed in the lower section of each of said vortex chambers, said inlet, outlets and vortex chamber defining at least one vertical gas vortex in the vortex chamber;

characterized in that said vortex chamber walls are formed of substantially planar wall sections, the cross section of said gas space is distinctly non-circular, having a circularity greater than 1, at least one wall of the vortex chamber is formed by a planar tube panel and said side walls (32) of each of said vortex chambers being parallelly arranged and aligned."

"18. A method of separating particles from a stream of high temperature gas having particles entrained therein, using a reactor as defined in Claim 1 or any claim dependent thereon, said method comprising the steps of continuously:

(a) introducing high temperature gas with particles entrained therein from the reactor into an upper portion (43) of the chambers at the same time;
(b) establishing at least one vertical gas vortex in each of the vortex chambers in which the gas swirls in the gas space coming in contact with the non-circular cross section of the vortex chamber;
(c) removing high temperature gas, from which particles have separated, from the vortex chamber; and
(d) removing separated particles from a lower portion of the vortex chamber."

V. In the oral proceedings the parties essentially argued as follows with respect to the **main request**:

(a) appellant

- irrespective of whether or not granted Figures 1 to 3 are designated to cover the claimed invention it is observed that the patent specification is obscure since it is not clearly specified what the invention is and what is an embodiment thereof; from the patent specification it is moreover not clear whether one or more vortex chamber(s) are achieved by the partition wall "70" and the skilled person would be misled by the description in which one vortex chamber is set out as "preferred" whereas in claim 1 on file at least two vortex chambers are prescribed;

- under these circumstances objections under Article 83, 100(b) EPC are justified;

- nearest prior art document is (D2) teaching two separator chambers in which hot gases enter; these chambers are composed of tube panels which according to reference signs "7" in Figures 1/3 are moreover planar;

- as could be seen from (D2) the known vortex chambers have to be seen as parallel and aligned; the subject-matter of claim 1 is therefore obvious in the light of (D2);

- a combination of (D1) and (D2) could be seen as a second way rendering the claimed subject-matter obvious since (D1) also relates to a steam generator and to gas cleaning; according to Figure 4 of (D1) planar tube walls of a centrifugal separator are clearly known and it would be irrelevant that the steam generator is positioned centrally; substituting the round separators of (D2) by planar-type separators according to (D1) achieves the subject-matter of claim 1 without the application of an inventive step; in this case further advantages would automatically be obtainable such as compactness, possibility to prefabricate planar tube panels and to weld them together on site;

- parallely working separators which are not restricted to a circular cross section are known from (D5) so that a skilled person could readily make use of these features when aiming at improving the known separator according to (D2) without the exercise of an inventive step.

(b) respondent

- what counts with respect to the issue of Article 83 EPC is the complete patent specification, making it clear that a partition wall creates two chambers which are adjacently and parallelly disposed;

- a skilled person was therefore aware of how to carry out the claimed invention since in the patent specification a definition of a "gas space" could be found, namely in that a gas in a vortex chamber can freely fill an inner space thereof, see column 4, lines 19 to 26, without being restricted by any elements, refractory layers or the like; to avoid any doubts the patent specification as a whole is restricted to at least two adjacently and parallelly disposed vertical vortex chambers and all embodiments directed to only one vortex chamber are deleted;

- appellant's interpretation of (D2) could be seen as an objection of the issue of novelty which however, would not be justified since this document was read knowing the claimed invention;

- (D2) contrary to appellant's findings does not disclose planar tube walls as claimed since only the bottom parts "7,7" according to Figures 1/3 of (D2) are planar not, however, the bodies forming the vortex chamber which are circular, see Figure 2 of (D2);

- (D1) aims at the creation of a compact steam generator and the separation of solid particles within the reactor in that the heat exchangers are centrally disposed in the reactor and are

surrounded by the separator;

- from the patent specification it is clearly derivable that a completely different concept is followed, namely by arranging the heat exchangers not centrally but lateral of the reactor and by making the arrangement of the centrifugal separator independent from the reactor;

- the subject-matter of claim 1 is therefore not rendered obvious by (D1) even if in this document in a completely different context - see Figures 3 and 4 - tube walls are disclosed either circular or polygonal and plane since there could not be seen any incentive for a skilled person to prefer the embodiment of planar tube walls to that of circular tube walls and to combine the concept laid down in (D1) with the teaching of (D2);

- completely irrelevant with respect to the subject-matter of claim 1 is the disclosure of (D5) not being based on planar tube walls nor on a fluidized bed reactor;

- under these circumstances a skilled person would therefore not combine (D1), (D2) and (D5) and even if he did he would maintain the circular form of the separator of (D2) corresponding to the embodiment laid down in Figure 3 (not 4!) thereof.

VI. At the end of the oral proceedings the board's Chairman issued the decision of the board with respect to claims 1 to 21 submitted during the oral proceedings as main request granting the respondent a time limit to file an amended description and the corresponding

figures, consistent with the claims of the main request.

VII. The appellant requests that the decision under appeal be set aside and the European patent No. 0 481 438 be revoked.

The respondent requests that the decision under appeal be set aside and that the patent be maintained on the basis of:

- claims 1 to 21 filed during the oral proceedings of 3 July 2002 (main request),

- description filed on 19 August 2002

- drawings filed on 19 August 2002

or on the basis of auxiliary requests submitted in the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Article 100(b) EPC*

2.1 According to Article 100(b) EPC an opposition can be filed on the ground that the European patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

2.2 In the application as originally filed (corresponding to EP-A2-0 481 438) two types of vortex chambers were disclosed

(a) single vertical vortex chambers according to Figures 5B, 7A and 7B and

(b) **at least two** adjacently and parallelly disposed vertical vortex chambers.

2.3 In the course of the opposition and appeal proceedings the above alternative of **single** vertical vortex chambers was no longer claimed and their corresponding embodiments deleted from the description and drawings, obviously not completely as set out by the appellant so that the description **is not fully consistent** with the claims. Under these circumstances the patent seen as a whole lacks clarity in the meaning of Article 84 EPC.

2.4 In this context it has to be added that at any time of the proceedings before the opposition division and the appeal board such a clarity objection can be overcome by the respondent (patentee) **by filing** a description and drawings **consistent with the claims**.

2.5 The appellant argued that a skilled person confronted with European patent No. 0 481 438 could not carry out the invention as claimed.

The board cannot share these findings for the following reasons:

2.6 Whether or not a description and drawings of a patent specification are fully consistent with its claims has nothing to do with the issue of whether or not a

skilled person can carry out the invention as claimed. There can be no doubt with respect to the technical meaning, see preamble of claim 1, of the feature "at least two adjacently and parallel disposed vertical vortex chambers" since not only the (clear) wording of the claim 1 has to be considered but also the drawings of the patent specification, for instance its Figures 5A, 6A, 6B, 8 to 10 clearly teaching a skilled person of how the claimed vortex chambers are geometrically arranged. Even if granted Figures 1 to 3 could be seen to fall outside the above feature of a multitude of vertical vortex chambers this could only be seen as an infringement of clarity/consistency but not as an obstacle for a skilled person to carry out the teaching of claim 1 of the main request.

2.7 As set out by the respondent the patent specification, see column 4, lines 19 to 25, contained further information for a skilled person with respect to the definition of a **gas space**, namely that in a vortex chamber a gas could freely fill an inner space thereof without being restricted by any elements, refractory layers or the like.

2.8 Finally it has to be observed, see remark V of the "Summary of Facts and Submissions" that the board asked the respondent to make the description/drawings consistent with claims 1 to 21 of the main request thereby also overcoming appellant's clarity objection.

2.9 Summarizing the above considerations the board is convinced that the requirements of Article 100(b) EPC are met so that appellant's findings to the contrary have to be rejected.

3. *Article 100(a) EPC*

3.1 Novelty was not disputed by the appellant and the board so that this issue needs no detailed considerations. The crucial issue to be decided is therefore inventive step in the light of (D1), (D2) and possibly (D5).

3.2 (D2) is seen as the nearest prior art document teaching a reactor and a centrifugal separator based on tube panels, see its claim 3. The cross sections of the known centrifugal separators are circular; the **lower region** of the known separators is funnel shaped, see reference signs "7" in Figures 1/3 of (D2), and is planar. It has to be observed that the said lower region of the separators is nothing else than the **outlet** of the separated solid particles but is not relevant with respect to the separation step as such. Only by inadmissible hindsight could a reader of (D2) derive therefrom that generally speaking the known reactor is formed by **planar** tube panels.

3.3 Contrary to the arguments of the appellant claim 1 of the main request is clearly delimited over (D2) and aims at the achievement of a simpler construction of the centrifugal separator - problem to be solved by the invention according to the problem - solution - approach when assessing the merits of the claimed improvement of the nearest prior art reactor/separator.

3.4 Claim 1 in its characterizing clause is based on substantially planar walls of its vortex chambers, non-circular cross sections of its gas spaces of a specified circularity being greater than 1, whereby at least one wall of the vortex chambers is formed by a planar tube panel being parallelly arranged and

aligned.

3.5 The respondent essentially pointed to the possibility of pre-fabricating made-to-measure water tube panels which can be easily assembled on site by welding leading to a simplified construction and offering a modular structure which is also advantageous with respect to its lining with refractory material, see EP-B1-0 481 438, column 3, line 59 to column 4, line 11 and column 5, lines 10 to 17.

3.6 In contrast to the solution of the above problem according to claim 1 (D1) aims at the creation of a compact steam generator and the separation of solid particles from the hot gasses within the reactor. As is obvious (D1) deals with the solution of a completely different technical problem not being addressed in EP-B1-0 481 438 and its solution is not followed in the attacked patent, namely to centrally arrange the heat exchangers "1" within the separator chambers "3,4". This concept is clearly not used in the claimed invention as can be seen from its Figure 1 - although not disclosing the subject-matter of claim 1 and the invention - however, indicating that a different concept with respect to (D1) is followed, namely by making the position of the heat exchangers "64, 66" **independent** from the reactor "10" **and from** the separator "12".

3.7 Under these circumstances a skilled person had no incentive to consider (D1) at all. Even if he, however, considered (D1) he would have realized that the separator could be **circular** according to Figure 3 (not claimed by the present invention) or could be polygonal according to Figure 4 i.e. having **planar** and tube

walls. (D1) does not favour one embodiment thereof over the other being a further indicia that **not knowing the claimed invention** a skilled person would not automatically turn to its embodiment according to Figure 4. It has moreover to be observed that (D2) as the starting point of the invention is based on separators having a **circular** cross section so that there cannot be seen any reason to replace this cross section by a **polygonal** cross section taught in (D1).

3.8 In the patent specification, see EP-B1-0 481 438, column 4, lines 19 to 25, a "gas space" is clearly defined, *inter alia* as a space "which can freely be filled up by gas ... without being restricted by any elements". The position of the heat exchangers **centrally** in the separator "3,4" according to (D1) teaches away from the above definition laid down in EP-B1-0 481 438 since in this case there is no **free space** for any hot gas to be cleaned. Considering these technological aspects a skilled person would not envisage a combination of (D1) and (D2).

3.9 In accordance with the respondent (D5) is seen as a document singly or in combination with other pieces of prior art which is irrelevant when dealing with the issue of inventive step since (D5) teaches away from planar tube walls combined with a fluidized bed reactor.

3.10 Summarizing, even if a skilled person envisaged a combination of (D1), (D2) and (D5) the subject-matter of claim 1 has to be seen as the result of an inventive endeavour so that claim 1 also meets the requirements of Articles 56 and 100(a) EPC and is valid.

3.11 The independent method claim, claim 18, is so closely related to claim 1 ("A method ... using a reactor as defined in claim 1 ...") that the above considerations are also applicable to this claim which therefore is valid for the reasons set out above.

3.12 The dependent claims 2 to 17 and 19 to 21 relate to embodiments of the subject-matter defined in claims 1 and 18 and are likewise valid.

Auxiliary requests

4. The **main request** being allowable there is no need to discuss the merits of the **auxiliary requests 1 to 3.**

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with an order to maintain European patent No. 0 481 438 in amended form on the following basis:

- claims 1 to 21 submitted on 3 July 2002,

- description: columns 1 to 14, submitted on 19 August 2002,

- drawings: Figures 1 to 12, submitted on 19 August 2002.

The Registrar: The Chairman:

A. Counillon C. T. Wilson