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**Datasheet for the decision  
of 12 April 2024**

**Case Number:** T 1264/21 - 3.3.06

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F23L7/00, F23G5/027, F23G5/50,  
F23G5/24

**Language of the proceedings:** EN

**Title of invention:**  
METHOD FOR PRODUCTION OF A CLEAN HOT GAS BASED ON SOLID FUELS

**Patent Proprietor:**  
Dall Energy ApS

**Opponent:**  
OBERNBERGER, Ingwald

**Headword:**  
Flue Gas Production/Dall Energy

**Relevant legal provisions:**  
EPC Art. 83

**Keyword:**  
Sufficiency of disclosure - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 1264/21 - 3.3.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.06**  
**of 12 April 2024**

**Appellant:** OBERNBERGER, Ingwald  
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**Representative:** Kuhnen & Wacker  
Patent- und Rechtsanwaltsbüro PartG mbB  
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**Respondent:** Dall Energy ApS  
(Patent Proprietor) Dr. Neergaards Vej 3, 1.  
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**Representative:** Plougmann Vingtoft a/s  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 23 June 2021  
rejecting the opposition filed against European  
patent No. 2334762 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chairman** J.-M. Schwaller  
**Members:** R. Elsässer  
R. Cramer

## Summary of Facts and Submissions

I. The appeal of the opponent is directed against the decision of the opposition division to reject the opposition against European patent 2 334 762, claim 1 thereof (with the feature labelling as proposed by the appellant) reading:

*"1. A method for converting a solid carbonaceous fuel into flue gas and ash in a thermal reactor (1), said method comprising heating the fuel at separate stages to temperatures causing the fuel to decompose into gaseous and solid components, the stages comprising*

- a) a drying stage (3) in which the fuel is heated to a temperature of 400°C or above, and means for feeding fuel to the drying stage (3),*
- b) a pyrolysis stage (4) in which the fuel is heated to a temperature of 500°C or above, in which the fuel is pyrolysed without addition of oxygen,*
- c) a gasification and oxidation stage (5) wherein the temperature is between 600-1100°C, in which char is converted to burnable gas and carbon-rich ash,*
- d) an ash burn-out stage (6) to which air is supplied wherein ash is burned to a carbon content below 10% on a weight basis and wherein the ash is cooled to a temperature below 300°C, and*
- e) a gas combustion stage (2) to which air is supplied to convert the combustible gases into CO<sub>2</sub> and H<sub>2</sub>O and wherein temperature is between 700°C-1100°C, wherein*
- f) the means for feeding fuel to the drying stage (3) is arranged to feed dried fuel from the drying stage (3) onto the pyrolysis stage (4),*
- g) the pyrolysis stage (4) is immediately above the gasification and oxidation stage (5),*

*g2) the fuel at the pyrolysis stage is heated by means of the gases formed in the gasification and oxidation stage (5) and the gas combustion stage (2),  
h) the drying stage (3), the pyrolysis stage (4) and the gasification and oxidation stage (5) and the ash burn-out stage (6) form an updraft gasifier and are carried out in an updraft moving bed reactor, and  
i) the gas combustion stage (2) is above the updraft gasifier where the gases from the updraft gasifier are burned and heat from the gas combustion is transferred to the top layer of fuel in the updraft gasifier, wherein the gas combustion process is carried out 4 metres or below from the bed surface, wherein  
j) the stoichiometric ratio of the thermal reactor is 1.2-1.3 and the gasification operates with a stoichiometric ratio of 0.2-0.25."*

II. In the contested decision, the opposition division found that the invention was sufficiently disclosed and that the subject-matter of claim 1 as granted was novel and inventive. It also decided not to admit into the proceedings the documents **D1a** (Reed T.B. et al.: Survey of Biomass Gasification, Volume II: Principles of Gasification. 1979. Web. doi: 10,2172/5901867; whole document), **D6** (M. Kaltschmitt, H. Hartmann : "*Energie aus Biomasse, Grundlagen, Techniken und Verfahren*", pages 272-281 and 427-453, Springer Verlag, 2001), **D7** ("*Handbook of Biomass Combustion and Co-Firing*", S. van Loo and J. Koppejan, pages 26-27, 2002) and **D8** ("*Handbook of Downdraft Gasifier Engine Systems*", SERI/SP-271-3022, DE88001135, March 1988, whole document).

III. With the grounds of appeal, the appellant argued that the invention as defined in granted claim 1 could not

be carried out by the skilled person. The decision on novelty and inventive step was not challenged.

IV. With its reply, the patent proprietor and respondent challenged the appellant's arguments and resubmitted the sets of amended claims, already filed as auxiliary requests 1-3 with the reply of 2 December 2019 to the notice of opposition.

V. At the oral proceedings held on 12 April 2024 the final requests of the parties were established as follows:

The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed, or in the alternative, that the decision under appeal be set aside and the patent be maintained in amended form, based on the claims of one of auxiliary requests 1 to 3 filed with letter of 2 December 2019.

### **Reasons for the Decision**

1. Article 100(b) EPC -Sufficiency of disclosure

The Board has come to the conclusion that it has not been shown that the invention cannot be reproduced by the skilled person for the following reasons.

1.1 The appellant's objection is in particular based on a specific understanding of the expression "separate stages", as the term "stage" was to be understood both spatially and functionally so that the requirement of "*heating the fuel at separate stages*" as stated in the preamble of claim 1 meant two things, namely that on the one hand, the heating had to take place at

different, separate locations and, on the other hand, the stages had to be functionally completely separate so that in the drying stage only drying could take place but not pyrolysis. In other words, the appellant argued that in order to carry out the invention as claimed, the skilled person would have to know how to heat the fuel to 400°C and above, without any pyrolysis occurring. Since this was physically impossible, the invention could not be carried out.

1.2 This objection does not convince the Board, which does not share the appellant's view that claim 1 requires that the various stages must be completely functionally separate or, in other words, that the claimed process excludes any pyrolysis occurring at the drying stage.

1.3 For the Board, the term "stage" as used in claim 1 is primarily to be understood in a spatial sense so that the different "stages" mentioned in the claim define different - and thereby separate - locations within the reactor. This follows directly from step f) which requires that the fuel is fed from the drying stage to the pyrolysis stage, and from step g1), which requires that the pyrolysis stage is above the gasification stage. Reference is also made to steps h) and i), which require that the drying, pyrolysis, gasification and ash burn-out stage form an updraft gasifier, whereby the gas combustion stage is above said gasifier. In view of this formulation, the Board concludes that the term "stage" is to be understood spatially, so that the "separate" stages mentioned in the preamble of the claim merely define different locations within the reactor in which the claimed method is carried out.

1.4 The Board acknowledges that in the context of the claim, the term "stage" also includes a functional

element. This is readily apparent from the names of the different "stages" and can also be derived from feature h), which states that the various stages are "carried out" in a moving bed reactor. However, this fact does not amount to an unambiguous requirement of a complete functional separation of the different stages, which interpretation is unlikely also in view of the fact that the claimed method is carried out in a moving bed reactor. In such a reactor, there are no partitions separating the locations in which the different processes take place so that there is necessarily some overlap. Since the term "separate stages" is used in this technical context, the skilled person understands that the term does not require a complete functional separation of the stages.

1.5 The appellant pointed out that claim 1 was a method claim, which is correct ; but it is common practice in patent law that method claims include or refer to the device in or with which the method is carried out. Therefore, the fact that claim 1 is a method claim does not mean that the term "stage" cannot be understood structurally and spatially, namely as denoting a specific location within the reactor in which the claimed method is carried out. This conclusion is not changed when the description (paragraph 0044) and figures 3 and 6 are taken into account because neither the description nor the figures contain such an unambiguous requirement.

1.6 Finally, the appellant argued that both steps a) and b) mentioned "the fuel" and concluded that "the fuel" had to be the same in both steps. Since however "the fuel" was at least partly pyrolysed and thereby destroyed in the drying stage, "the" (same) fuel could not be treated in the pyrolysis stage.

- 1.7 For the board, this argument is however more of a linguistic than of a technical nature. Moreover, the preamble of claim 1 states that in the claimed process, "the fuel" is heated at separate stages, whereby the stages include e.g. the ash burnout stage where the fuel, according to the appellant's own argument, is already largely destroyed. From this, it follows that the fuel mentioned in step b) must not be structurally and chemically identical to the one mentioned in step a), so that the possibility of the fuel being partially pyrolysed in step a) is not excluded.
- 1.8 In a development of the attack discussed above, the appellant argued that the invention could not be carried out since at the claimed temperature of 400°C or above pyrolysis was complete already at the drying stage, so that the subsequent pyrolysis stage could not be put into practice. In this context, the appellant pointed out that the temperature mentioned in feature a) did not relate to the stage, but to the fuel so that the fuel itself had to be brought to this temperature and not necessarily the stage. At the oral proceedings, the appellant pointed out that this requirement applied to the fuel in its entirety, and taking as an example a wood pellet fed into a hot drying stage, its temperature would increase first on the surface and then gradually towards its center, and so such a pellet would fulfil the temperature requirement of feature a) only when its core temperature reaches 400°C or more. However at that point of time, the outer parts of the pellets would already be completely pyrolysed so that a subsequent pyrolysis at stage b) would not be possible.
- 1.9 This is however not convincing the board, since the claim does not require that the fuel has to reach 400°C or more in its entirety. Furthermore no method for

determining the temperature is specified in the claim. Therefore, in the board's view the temperature at the surface of the fuel represents the temperature of the fuel, and so the material in the center of the pellet will be at a much lower temperature and therefore not completely pyrolysed, in particular when the pellet is subjected to rapid heating, as explicitly taught in paragraph 0050 of the patent.

As to the method of measurement to be used for determining the temperature of the fuel, there is no evidence on file that the skilled person would have any difficulty in finding a suitable method.

- 1.10 The appellant also argued that the temperature ranges in stages a) and b) being open ended and overlapping, the temperature in the drying stage could thus be much higher than 400°C, which exacerbated the problems discussed above.

This argument is however not convincing the board, which accepts that much higher temperatures are in principle "covered" by the claim, but such temperatures are not explicitly claimed. Moreover, the same temperatures would be "covered" if the claim did not specify the temperatures at all.

The same applies to the situation discussed by the appellant, in which the temperature of the pyrolysis stage would be lower than in the drying stage, which is also not explicitly claimed.

- 1.11 In support for its allegation that carbonaceous fuel such as biomass would be pyrolysed at temperatures of 400°C and above, the appellant pointed to **D1a, D6-D8** and requested to admit these documents into the

proceedings. Since this fact is not disputed by the Board, there is no need to decide on the admissibility of these documents. As set out above, the appellant's objections do not fail because the Board is of the opinion that pyrolysis does not take place in the drying stage, but because such a partial pyrolysis is not excluded by the claim.

1.12 It follows from the above considerations that, based on the claim and the additional teachings in the description and drawings, the skilled person is not hindered to carry out the invention. As acknowledged by the appellant (top of page 5 of its submission of 15 March 2024), the patent teaches that the drying stage and the pyrolysis stage are not separated by a structurally well defined boundary. Rather, the patent teaches that the fuel can be pushed in the direction of the reactor to be dried first and then to be pyrolysed, whereby the fuel is heated by the means specified in the claim so that its temperature increases. At some position of this journey, the fuel will have reached a temperature of 400°C or above. This area (and the processes taking place therein) can be identified as the drying stage. The area located behind, beginning at the point where the temperature has reached 500°C or more, can be identified as the pyrolysis stage. In the board's view and conviction, there is no reason why the skilled person should not be able to put this method into practice.

1.13 At the oral proceedings, the respondent acknowledged that figure 3 of the patent was no longer covered by claim 1. It is however not unusual that embodiments covered by the claims as filed are not covered any more by the granted claims. While this should have been

clarified in the description, the failure to do so does not amount to a lack of sufficiency.

2. As the appellant has not succeeded in showing that the invention claimed is insufficiently disclosed, its appeal must fail and the decision of the opposition division becomes final.

## Order

### **For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated