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**Datasheet for the decision
of 1 March 2018**

Case Number: T 1340/14 - 3.3.06

Application Number: 08801028.5

Publication Number: 2222821

IPC: C10L5/44, C10L5/48

Language of the proceedings: EN

Title of invention:

FUEL AND METHOD OF OBTAINING THERMAL ENERGY FROM BIOMASS WITH LOW ASH- MELTING TEMPERATURE, IN PARTICULAR FROM STILLAGE FROM BIOETHANOL PROCESSING, AND APPARATUSES FOR THE IMPLEMENTATION THEREOF

Applicant:

Ptacek, Milan

Headword:

Ash-melting temperature / PTACEK

Relevant legal provisions:

EPC Art. 52(1), 54, 56, 84, 123(2)
RPBA Art. 13

Keyword:

Admittance of claim requests filed at the oral proceedings
(yes)

Amendment - Main Request - extension beyond the content of the
application as filed (yes)

Clarity - 1st to 3rd Auxiliary Requests (no)

Novelty and inventive step - 4th Auxiliary Request (yes)

Decisions cited:

Catchword:



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Case Number: T 1340/14 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 1 March 2018

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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 3 January 2014
refusing European patent application No.
08801028.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman B. Czech
Members: P. Ammendola
S. Fernández de Córdoba

Summary of Facts and Submissions

- I. This appeal lies from the decision of the Examining Division to refuse European patent application no. 08 801 028.5.
- II. At the oral proceedings before the Examining Division the Applicant had filed a set of amended claims as 3rd (and lowest ranking) Auxiliary Request, claim 1 thereof reading as follows:

"1. A method of production of a fuel, including a step of mixing of biomass with low melting temperature of ashes from a group consisting of stillage from the production of bioethanol, cereals, residues from the production of sunflower-seed oil or rape-seed oil, extracted corn meal, corn flour, maize, maize flour or maize meal, with at least one milled substance selected from the group consisting of limestone, lime hydrate, lime, stone, sand, combustion ashes, products of desulphurization, aggregates, fossil solid fuels as coal, lignite, peat, artificial fuels produced from the group of petrol cokes, biomass fuels with high melting temperature of ashes from a group consisting of wood chips, rape straw, hay, grasses, energy crops as sorrel, hop-tree characterised in that the ratio of the biomass with low melting temperature of ashes to milled substances in the fuel mixture is set up to achieve a ratio of total weight of sodium and potassium in the ashes to the remaining non-combustible components in the ashes having a value less than 1 : 5.85."

Independent claim 6 of said 3rd Auxiliary Request is directed to a *"method for obtaining thermal energy from biomass with low melting temperature of ashes ..."*.

III. In the contested decision the Examining Division found that none of the then pending claim requests complied with all the requirements of the EPC. In particular, the method of claim 1 of the 3rd Auxiliary Request, although found to comply with Articles 84 and 123(2) EPC and the novelty requirement, was found not to involve an inventive step in view of the prior art disclosed in document

D5 = "Control of in-bed agglomeration by fuel blending in a pilot scale straw and wood fueled AFBC",
Salour D. *et al.*, Biomass and Bioenergy, 1993,
vol. 4, pages 117 to 133.

IV. In the statement setting out the grounds of appeal, the Appellant maintained the Main and 3rd auxiliary claim requests that had been pending before the Examining Division and rebutted the finding of the Examining Division in respect of these requests.

V. The Appellant was summoned to oral proceedings. In a communication issued in preparation therefor, the Board *inter alia* raised the following two new objections in respect of the set of claims of the 3rd Auxiliary Request:

- the terms "*products of desulphurization*" and "*aggregates*" present in claims 1 and 6 (this latter being an independent claim directed to a method for obtaining thermal energy from biomass) appeared to be unclear (Article 84 EPC), and
- due to the omission, in claim 6, of the feature relating to the "*critical*" combustion temperature causing slagging, this claim was objectionable under Article 123(2) EPC.

VI. At the oral proceedings held on 1 March 2018, the Appellant filed new claims requests respectively labelled Main Request, 1st Auxiliary Request, 2nd Auxiliary Request, 3rd Auxiliary Request (final version thereof filed at 10:15) and 4th Auxiliary Request.

VII. Final requests

The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the claims according to the Main Request or, in the alternative, on the basis of the claims according to one of the 1st Auxiliary Request, 2nd Auxiliary Request, 3rd Auxiliary Request (10:15) and 4th Auxiliary Request, all requests filed during the oral proceedings.

VIII. Claim 6 of the **Main Request** filed at the oral proceedings reads:

"6. Method for obtaining thermal energy from biomass with low melting temperature of ashes said biomass being from a group consisting of cereals, residues from the production of sunflower-seed oil or rape-seed oil, corn meal, flour from cereals, maize, maize flour or maize meal, the biomass with low melting temperature of ashes being complemented by milled substances selected from the group consisting of limestone, lime hydrate, lime, stone, sand, combustion ashes, products of desulphurization, aggregates, fossil solid fuels as coal, lignite, peat, solid fuels produced from sludge waste water treatment plants, artificial fuels produced from the group of petrol cokes, biomass with high melting temperature of ashes, from a group consisting of wood chips, rape straw, hay, grasses, tree pruning residues, energy crops as sorrel, hop-tree, the ratio of the biomass with low melting temperature of ashes to

the milled substances is set up to achieve a ratio of total weight of sodium and potassium in the ashes to the weight of the remaining non-combustible components in the ashes of a value less than 1 : 5.85 and then the obtained mixture is gradually combusted in the furnace of the combustion apparatus."

Claim 6 of the **1st Auxiliary Request** differs from claim 6 of the Main Request in that it comprises additional features (made apparent by the Board) and reads:

*"6. Method for obtaining thermal energy ... the biomass with low melting temperature of ashes being complemented by ... hop-tree, **the critical combustion temperature causing slagging in the furnace and/or on the heat transfer surfaces and/or of the fluidised bed is ascertained and** the ratio of the biomass ... is set up to achieve ... a value less than 1 : 5.85, **and a higher melting temperature of the ashes of the resulting mixture than the ascertained critical combustion temperature** and then the obtained mixture ..."*

Claim 6 of the **2nd Auxiliary Request** differs from claim 6 of the 1st Auxiliary Request in terms of the following amendments (deletions and insertions made apparent by the Board):

*"6. Method for obtaining thermal energy ... complemented by ... petrol cokes, ~~biomass with high melting temperature of ashes, from a group consisting of wood chips, rape straw, hay, grasses, tree pruning residues, energy crops as sorrel, hop tree,~~ **wherein** the critical combustion temperature ..."*

Claim 1 of the **3rd Auxiliary Request (10:15)** reads as follows (differences compared to claim 1 of the 3rd Auxiliary Request refused by the Examining Division (see II *supra*) made apparent by the board)):

"1. A method of production of fuel **for obtaining thermal energy from biomass with low melting temperature of ashes** including a the step of mixing of biomass with low melting temperature of ashes from a group consisting of stillage from the production of bioethanol, cereals, residues from the production of sunflower-seed oil or rape-seed oil, extracted corn meal, corn flour, maize, maize flour or maize meal, with at least one milled substance selected from the group consisting of limestone, lime hydrate, lime, stone, sand, combustion ashes, products of desulphurization, aggregates, fossil solid fuels as coal, lignite, peat, artificial fuels produced from the group of petrol cokes, ~~biomass fuels with high melting temperature of ashes, from a group consisting of wood chips, rape straw, hay, grasses, energy crops as sorrel, hop tree~~ characterised in that the ratio of the biomass with low melting temperature of ashes to milled substances in the fuel mixture is set up to achieve a ratio of total weight of sodium and potassium in the ashes to the remaining non-combustible components in the ashes having a value less than 1 : 5.85."

Claim 1 of the **4th Auxiliary Request** reads as follows (differences compare to claim 1 of the 3rd Auxiliary Request refused by the Examining Division, see II *supra*, made apparent by the Board):

"1. A method of production of fuel including a the step of mixing of biomass with low melting temperature of ashes from a group consisting of stillage from the

*production of bioethanol, cereals, residues from the production of sunflower-seed oil or rape-seed oil, extracted corn meal, corn flour, maize, maize flour or maize meal, with at least one milled substance selected from the group consisting of limestone, lime hydrate, lime, stone, sand, combustion ashes, ~~products of desulphurization, aggregates,~~ fossil solid fuels as coal, lignite, peat, artificial fuels produced from the group of petrol cokes, ~~biomass fuels with high melting temperature of ashes, from a group consisting of wood chips, rape straw, hay, grasses, tree pruning residues, energy crops as sorrel, hop-tree~~ characterised in that the ratio of the biomass with low melting temperature of ashes to milled substances in the fuel mixture is set up to achieve a ratio of total weight of sodium and potassium in the ashes to the remaining non-combustible components in the ashes having a value less than 1 : ~~5.85~~ **15**."*

Dependent claims 2 and 3 of the 4th Auxiliary Request are directed to more specific embodiments of the method of claim 1.

IX. The Appellant's arguments of relevance here can be summarised as follows.

Main Request

Claim 6 was based on a combination of method claims 6 and 10 of the application as filed, disclosing a method for obtaining thermal energy from **biomass** with **low melting temperature of the ashes** (herein below **biomass with LMTA**). There was no need to recite in claim 6 of the Main Request also the steps prescribed in claim 6 of the application as filed of

- ascertaining the **critical combustion temperature**

causing slagging (herein below **CC temperature**), and
- setting the (amount) ratio of the biomass with LMTA
to the milled substance (herein below **biomass/
substance ratio**) such as to achieve a melting
temperature of the ashes of the resulting mixture
higher than the ascertained CC temperature.

Indeed, claim 6 of the Main Request already required
that the biomass/substance ratio had to be set so as to
achieve a weight ratio in the mixture's ashes of
[sodium and potassium] : [further non-combustible
components in the ashes] (herein below this weight
ratio is indicated as the **Na+K/ash-rest ratio**)
necessarily corresponding to a melting temperature of
the ashes of the mixture higher than the CC temperature
of the biomass with LMTA *per se*.

Thus, claim 6 of the Main Request was not objectionable
under Article 123(2) EPC.

1st and 2nd Auxiliary Requests

Claim 6 of the 1st Auxiliary Request as well as claim 6
of the 2nd Auxiliary Request complied with the
requirements of Article 84 EPC because it was clear
that:

- (a) the "*aggregates*" mentioned therein were stones
having a specified size;
- (b) the "*products of desulphurisation*" also mentioned
therein were mixtures of milled materials, which
had been used for desulphurization of flue gases.

At the oral proceedings, the Appellant answered to the
question (that had arose at the hearing) as to the
meaning of the wording "*critical combustion temperature
causing slagging*" also mentioned in these versions of
claim 6, by stating that it clearly defined the
temperature at which the biomass with LMTA *per se* could

not be combusted, because the ashes produced by the combustion caused build-up of slag in the furnaces of the fluidized bed boilers conventionally used for recovering energy from biomasses. However, the Appellant also acknowledged that the application itself disclosed alternative conditions generally applicable to the combustion process which would manifestly influence the CC temperature.

3rd Auxiliary Request (10:15)

Claim 1 of the 3rd Auxiliary Request, also comprising the terms "*aggregates*" and "*products of desulphurisation*" objected to by the Board under Article 84 EPC, was clear for the reasons indicated with regard to claim 6 of the 1st and 2nd Auxiliary Requests.

The Appellant also stressed that the wording "*for obtaining thermal energy from biomass with low melting of the temperature of ashes*", objected to by the Board under Article 84 EPC, had been added to claim 1 to simply stress that the fuel prepared according to the claimed method allowed the recover energy from biomasses with LMTA.

4th Auxiliary Request

The method of claim 1 was not obvious. As also apparent from some of the invention examples, the inventor had found that when the biomasses with LMTA listed in this claim were admixed with sufficient amounts of the listed milled substances, so as to achieve the most preferred Na+K/ash-rest weight ratio of "*less than 1 : 15*", the melting temperature of the ashes of the resulting mixture always increased to values higher

than 1300°C, i.e. their melting temperatures were well above those normally occurring in any sort of boilers conventionally used for burning biomasses. Such an improvement could not possibly be predicted by the person skilled in the art reading D5, if only for the reason that in this prior art, even when the biomass with LMTA used (i.e. rice straw) only constituted as low as 10% of the mixture, the Na+K/ash-rest ratio remained much higher than 1 : 15.

Reasons for the Decision

Admittance of the pending claim requests into the proceedings

1. All pending claim requests by the Appellant were filed during the oral proceedings before the Board.
 - 1.1 They were all filed in reaction to the objections specified by the Board in its communication and/or at the oral proceedings. Since they did not give rise to additional complex questions, it was possible to deal with each of them at the oral proceedings (Article 13(3) RPBA).
 - 1.2 The Board, in the exercise of its discretion pursuant to Article 13(1) RPBA, thus decided to admit the Appellant's Main and 1st to 4th Auxiliary Requests into the proceedings.

Main Request - Added subject-matter

2. Claim 6 at issue (wording under VIII, *supra*) is directed to a "*method for obtaining thermal energy from biomass with [LMTA]*". The Board notes that the application as filed contains an explicit disclosure

corresponding in part to the wording of this claim in the paragraph bridging pages 5 and 6, in the last paragraph on page 6, as well as in claims 6 of the application as filed and claim 10 dependent thereon. However, none of these parts of the application as filed provides a definition that explicitly corresponds to that of claim 6 under consideration. This is undisputed.

- 2.1 Nevertheless, in the Appellant's opinion, claim 6 of the Main Request described the same method that is already described by the combination of claims 6 and 10 of the application as filed, despite of the fact that claim 6 of the pending Main Request does not explicitly mention two steps expressly required according to claim 6 of application as filed, namely
- ascertaining the CC temperature and
 - setting the biomass/substance ratio so as to achieve a melting temperature of the ashes of the resulting mixture higher than the ascertained CC temperature.
- 2.1.1 In particular, in the Appellant's opinion, the explicit mention of these two steps was unnecessary since claim 6 at issue also indicated that biomass/substance ratio had to be set so as to achieve a Na+K/ash-rest ratio of less than 1 : 5.85. In the Appellant's view, the application as a whole implied the teaching that a Na+K/ash-rest ratio of less than 1 : 5.85 necessarily implied a melting temperature of the ashes of the mixture higher than the CC temperature of the biomass.
- 2.1.2 The Board notes however that this argument is *per se* nothing more than a vague and unsupported allegation. Indeed, the Appellant did not identify explicit part of teaching in the application as filed that could be considered to suggest, let alone to necessarily imply,

that any mixture of biomass(es) and milled substance(s) embraced by the lists given in claim 6 at stake resulting in ashes with the required Na+K/ash-rest weight ratio, necessarily has a melting temperature of the ashes higher than the CC temperature of the corresponding biomass(es).

2.1.3 Thus, the Appellant did not convince the Board that the alleged teaching was implicitly (but directly and unambiguously) disclosed in the application as filed.

2.1.4 Accordingly, in the Board's judgement, the method claim 6 under consideration does not find a fair basis in the relevant passages of the application as filed invoked by the Appellant, because this claim does not recite the two method steps of claim 6 of the application as filed identified under 2.1 *supra*.

Claim 6 under consideration being broader than claim 6 of the application as filed, the former extends to subject-matter not disclosed in the application as filed.

2.2 Thus, if only for this reason, claim 6 of the Main request is objectionable under Article 123(2) EPC.

3. The Appellant's Main Request is thus not allowable.

1st and 2nd Auxiliary Requests - Lack of clarity

4. The respective claims 6 of these requests (see VIII, *supra*) are also both directed to "a method for obtaining thermal energy from biomass with [LMTA]". The Board notes that these claims comprise, as elements of the list of the possible "milled substances" the terms "aggregates" and "desulphurisation products".

- 4.1 It is undisputed that none of these latter two terms finds a precise definition in the rest of the application.
- 4.2 The Appellant submitted that "*aggregates*" would be made up of stones having a specified size and the "*products of desulphurisation*" would be mixtures of milled materials that have been used for desulphurization of flue gases (see Appellant's letter of 14 February 2018, page 2, second and third sentence).
- 4.2.1 The Board notes, however, that the Appellant did not provide evidence that these terms were conventionally with these very particular meanings in the relevant technical field.
- 4.2.2 The Board holds that these terms are vague, i.e. may be used with different meanings. In particular,
- "*aggregates*" may possibly indicate aggregates of various different organic and inorganic compounds of various morphology, other than aggregates made of stones, and
- "*desulphurisation products*" may indicate different particulate materials other than those conventionally used for desulphurizing flue gas (e.g. desulphurized coal could also be regarded as a product of a process of "*desulphurisation*").
- 4.2.3 Hence, in the Board's judgement, the terms "*aggregates*" and "*desulphurisation products*" referred to in claim 6 as possible "*milled substances*" lack clarity because they are vague and do not unambiguously express the allegedly intended meaning.
- 4.3 Moreover, claims 6 of the 1st and 2nd Auxiliary requests define features of the claimed method by referring to

the CC temperature, i.e. the "*critical combustion temperature causing slagging*" (see under VIII, *supra*, the wording in these claims reading "... *the critical combustion temperature causing slagging in the furnace and/or on the heat transfer surfaces and/or of the fluidised bed is ascertained and the ratio of the biomass ...is set up to achieve ... a value less than 1 : 5.85, and a higher melting temperature of the ashes of the resulting mixture than the ascertained critical combustion temperature*").

- 4.3.1 The Board finds that the expression "*critical combustion temperature causing slagging*" is non-conventional and manifestly unclear *per se*.
- 4.3.2 The meaning of this expression is not sufficiently clarified in the description of the application either. The description only allows to conclude that for each biomass with LMTA the corresponding CC temperature is the temperature prevailing during the combustion of the biomass in an unspecified conventional boiler, and at which temperature the build-up of slag "*challenges*" or even "*renders impossible*" the operation of the boiler (see e.g. on page 2, lines 3 to 7 and all the examples). No further information is given as to how such CC temperature is to be determined, i.e. under which specific combustion conditions and/or at which specific the slag build-up level). This is also undisputed.
- 4.3.3 In addition, the patent application itself refers to several different options generally applicable as regards the combustion conditions, all of which are also manifestly may have a substantial bearing on the furnace temperature at which slag is build-up. Reference is made in particular to the disclosed

general options (i.e. also concerning the boiler in which the biomass is combusted) of additionally feeding fossil fuels (see page 7, lines 14 to 17 of the application as filed), or of using of water-cooled grates (mentioned in the last paragraph on page 12 of the application).

- 4.3.4 Hence, the CC temperature is *per se* a feature referring to an unconventional numerical parameter that is unclear because the conditions under which it is to be determined (type of furnace and combustion operating conditions) are ill-defined.
- 4.4 If only for the above reasons, claim 6 of the 1st Auxiliary Request and claim 6 of the 2nd Auxiliary Request are both objectionable under Article 84 EPC.
5. Therefore, none of the 1st and 2nd Auxiliary Requests is allowable.

3rd Auxiliary Request (10:15) - lack of clarity

6. Claim 1 of this request defines a "*method of production of fuel ...*". This claim, like claim 6 of the 1st Auxiliary Request, refers to "*aggregates*" and "*desulphurisation products*".

For the reasons set out under 4.1 to 4.2.3, *supra*, claim 1 at issue is thus also found to be objectionable for lack of clarity (Article 84 EPC).

7. Moreover, in this claim the definition "*A method for producing fuel ...*" is followed by the wording "*for obtaining thermal energy from biomass with low melting temperature of ashes*".

- 7.1 According to the Appellant, this wording was merely supposed to mean that the fuel prepared in accordance with the claimed method allows to recover energy from biomasses with LMTA.
- 7.2 However, the Board holds that such wording does not clearly express this intended meaning but, quite to the contrary, introduces a (new) ambiguity as to the nature of claimed subject-matter, namely whether the method claimed encompasses only the actual production of fuels or whether it covers also the subsequent combustion of the so-prepared fuels.
- 7.3 Claim 1 thus also lacks clarity (Article 84 EPC) for this reason.
8. Thus, the 3rd Auxiliary Request (10:15) is not allowable either.

4th Auxiliary Request

9. Formal allowability
- 9.1 Claim 1 of the 4th Auxiliary Request is also directed to a method of production of fuel (wording under VIII, *supra*), but no longer contains those features of higher ranking claim request that were found to be objectionable for lack of clarity (see 4.1 to 4.2.3. and 6, *supra*).
- 9.2 Claim 1 at issue comprises an exhaustive list of specific (and clearly identified) alternatives for the biomass(es) to be used in the claimed method. Hence, the Board holds that the fact that the biomass is still labelled by the (*per se* vague) expression "*with low melting temperature of ashes*" does not add any

uncertainty as to the kind of biomass that can be used. On the contrary, the meaning of this expression is immediately understood by a person skilled in the art (of recovery of energy from biomasses). In the convincement of the Board, this person certainly knows that all the biomasses specifically listed in claim 1 are normally not burned *per se* in conventional combustion power facilities because they produce ashes that immediately soften/melt and, thus, cause build-up of slag in the furnace. Thus, the expression in question simply reminds the person skilled in the art reading claim 1 that all the listed biomasses possess such (problematic) property hindering their use *per se* as fuel in conventional combustion power facilities.

Hence, the presence in claim 1 of the expression "*with low melting temperature of ashes*" is not objectionable under Article 84 EPC.

- 9.3 The Board is thus satisfied that claims 1 to 3 comply with the requirements of Article 84 EPC.
- 9.4 Moreover claims 1 to 3 are fairly based on the following parts of the application as filed:
- 9.4.1 Claim 1 at stake defines the milled substance to be mixed with the biomass with LMTA by means of a list of possible alternatives that, although more restricted in comparison to that comprised e.g. in the original (product) claim 1 (directed to the fuel formed by mixing the milled substance with the biomass with LMTA), remains very broad and general. Moreover, it requires that the Na+K/rest-ash ratio in the ashes of the produced mixture must have a value in the narrower range "*less than 1 : 15*", disclosed as most preferred range in the application as filed (see e.g. page 6,

last paragraph; claim 3).

Hence, the definition in claim 1 of the 4th Auxiliary Request corresponds to an allowable amendment/limitation of the original description from page 4, line 16 to page 5, line 14, in the last paragraph of page 6, as well as in the original (product) claims 1 and 3.

9.4.2 Claims 2 and 3 correspond to a similarly allowable amendment/limitation of the original description on page 5, lines 15 to 17, on page 6, lines 10 to 19, as well as of the original (product) claims 4 and 5.

9.5 The Board is thus also satisfied that claims 1 to 3 comply with the requirements of Article 123(2) EPC.

10. Novelty

10.1 None of the documents on file describes the mixing of a type of "biomass with [LMTA]" listed in claim 1 with a type of "milled substance" listed in claim 1. In particular, claim 1 neither embraces the use of rice straw and nor the use of wood chips, described in D5 as the materials to be mixed for producing a fuel.

10.2 The subject-matter of claims 1 to 3 at issue is thus novel (Article 52(1) and 54 EPC).

11. Inventive step

11.1 The invention

The invention as claimed according to the request at issue is directed to a method of preparing a fuel comprising biomass with LTMA.

More particularly, the method according to the invention as claimed comprises the step of mixing

(a) biomass with LMTA (selected) from a specific group of such biomasses

with

(b) at least one milled substance selected from a specific group of such substances

at a ratio of biomass to milled substance(s) such that the Na+K/ash-rest weight ratio in the ashes of the mixture is a value of "*less than 1 : 15*".

The required Na+K/ash-rest weight ratio corresponds to a percentage by weight of sodium and potassium in the ashes of the mixture of less than about 6.3% (1/16).

11.1.1 From the application as filed as a whole (see in particular, on pages 2 to 4, the acknowledgement of the background art and the beginning of the section entitled "*Brief disclosure of the invention*"), it clearly emanates that the ultimate aim of the invention is to provide a way for permitting to recover thermal energy by combustion of biomasses with LMTA.

11.2 Closest prior art

11.2.1 Considering the similarities in terms of technical issues addressed and methods disclosed in D5 and the present application, respectively, the Board considers that D5 represent the closest prior art for the assessment of inventive step.

- 11.2.2 Indeed, D5 addresses the general problem of obtaining thermal energy from a biomass (rice straw) that is described as "proven recalcitrant in its use as a fuel in combustion power facilities" because of its "low ash deformation temperatures which leads to slagging" (see in D5, page 118, left column, lines 7 to 13).
- 11.2.3 More particularly, D5 discloses the preparation of a blend of 10 wt% of rice straw and 90 wt% of wood demolition waste which permits "successful operation" of the combustion reactor (see Tables 8 to 10 in combination with page 131, right column, section "6. SUMMARY AND CONCLUSIONS", lines 17 to 19).

For the Board, the method of preparing this particular mixed fuel is the most appropriate starting point for the assessment of inventive step.

11.3 Technical problem

- 11.3.1 In the light of the disclosure of D5 (11.2.2 and 11.2.3, *supra*) the technical problem can thus merely be seen in providing a further method for producing fuels comprising biomasses with LMTA that can be combusted in conventional boilers.

11.4 Solution

According to the definition given in claim 1 at stake this problem is solved by the provision of a method which is characterised in particular by "*mixing at least on biomass with [LMTA]*" selected from the list according to claim 1 with "*at least one milled substance*" selected from a list of such substances indicated in claim 1, at ratios such that the

corresponding ashes have a NaK/ash-rest "*value of less than 1 : 15*".

11.5 Success of the solution

11.5.1 The application as filed contains the following relevant information:

- Some biomasses encompassed by the list in claim 1 (see Examples 1 to 3) are reported to have ash-melting temperatures well below 1000 °C, the total weight percentage of sodium and potassium in their ashes being well above 6.3%, i.e. the Na+K/ash-rest ratio certainly well above 1 : 15.
- The ashes of the mixtures prepared in accordance with the claimed method and having, thus, a Na+K/ash-rest ratio of less than 1 : 15, have such a high melting temperature (well above 1300°C) that "*there is no danger of the furnace temperature increasing above the ash melting temperature of the fuel mixture*" (see Examples 7 to 10).

11.5.2 The Board thus sees no reason to call into question the plausibility of the Appellant's statement that the ashes of (at least) the specific biomasses with LMTA listed in claim 1 all display a Na+K/ash-rest ratio much higher than "*1 : 15*", and that their mixing with an appropriate amount of at least one of the "*milled substances*" listed in claim 1 allows to produce mixtures whose ashes have, instead, a Na+K/ash-rest ratio "*of less than 1 : 15*", thereby ensuring that the mixtures can be used as fuels in conventional boilers of combustion plants, because the ashes as such mixed fuels necessarily have melting temperatures well above those normally occurring in such boilers.

11.5.3 Accordingly, the Board concludes that the technical

problem posed is credibly solved across the ambit of claim 1.

11.6 Non-obviousness of the proposed solution

11.6.1 The Board notes that in claim 1 at stake the listed "*milled substances*" encompass "*fossil solid fuels as coal, lignite, peat, artificial fuels produced from the group of petrol cokes*" etc. Considering that D5 discloses mixing a biomass with LMTA with a solid substance normally used as fuel in conventional combustion power facilities (i.e. wood waste, which is however not a fossil fuel), a question that arises in the assessment of inventive step is whether it was obvious to the person skilled in the art to solve the posed problem by admixing one of the selected biomasses with LMTA listed in claim 1 with a solid fuel so as to achieve the particularly low Na+K/ash-rest ratio as required according to claim 1 at issue.

i) It emanates from the table 8 of document D5 that the weight percentage of sodium and potassium in the ashes not only of rice straw *per se* (i.e. of the particular biomass with LMTA considered in this document) but also of the wood waste *per se* is much higher than the total weight percentage of sodium and potassium of 6.3% or less (i.e. correspond to the Na+K/ash-rest ratio well above the maximum "*of less than 1 : 15*") required in present claim 1.

ii) Hence, it is apparent that the wood waste added to the rice straw to obtain mixtures that can be successfully combusted is manifestly unsuitable to provide mixtures of wood waste and biomasses with LMTA having in their ashes an amount of sodium and potassium

below the maximum of 6.3% as now required in the claimed method.

iii) Thus, D5 contains no pointer to the possibility of admixing, to the biomass with LMTA, one of the solid fuels for combustion power facilities listed in claim 1, let alone in relative amounts appropriate to ensure that Na+K/ash-rest weight ratio is reduced to a value "*of less than 1 : 15*".

11.6.2 Nor does any such direct or indirect pointer to the possibility of mixing biomasses with solid fuels appear to be contained in any of the available documents.

11.7 Furthermore, neither D5 nor any of the other cited prior art documents comprises a pointer to the mixing of the biomass with LMTA with any of the other milled substances listed in claim 1 at stake (i.e. "*limestone, lime hydrate, lime, stone, sand, combustion ashes*") which are no fuel, let alone to carry out such mixing in ratios ensuring that Na+K/ash-rest weight ratio is reduced to a value "*of less than 1 : 15*", in order to solve the technical problem posed.

11.8 Based on the above considerations, the Board concludes that the claimed method was not obvious to the person skilled in the art having regard to the state of the art. The subject-matter of claims 1 to 3 thus involves an inventive step (Articles 52(1) and 56 EPC).

Conclusion

12. The claims according to the Appellant's 4th Auxiliary Request comply with the requirements of the EPC.

Order

For these reasons it is decided that:

- The decision under appeal is set aside.
- The case is remitted to the Examining Division with the order to grant a patent with claims 1 to 3 according to the 4th auxiliary request filed during the oral proceedings and a description and figures to be adapted thereto where appropriate.

The Registrar:

The Chairman:



D. Magliano

B. Czech

Decision electronically authenticated