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Datasheet for the decision of 8 July 2015

Case Number: T 0266/13 - 3.3.05

Application Number: 98959575.6

Publication Number: 1036048

IPC: C04B38/00, C04B38/06, C04B35/195

Language of the proceedings: EN

Title of invention:
METHOD FOR FIRING CERAMIC HONEYCOMB BODIES

Patent Proprietor:
Corning Incorporated

Opponents:
Vossius & Partner Patentanwälte Rechtsanwälte mbB
Rauh Peter A.

Headword:
Firing of ceramic honeycombs/CORNING

Relevant legal provisions:
EPC Art. 56, 111(1)
EPC R. 103(1)(a)
RPBA Art. 13(1)

Keyword:

Inventive step -
main request and first to third auxiliary requests (no)
Inventive step - obvious alternative
Reimbursement of appeal fee -
substantial procedural violation (no)
Remittal to the department of first instance - (yes)

Decisions cited:

Catchword:

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Case Number: T 0266/13 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 8 July 2015

Appellant I: (Patent Proprietor)	Corning Incorporated 1 Riverfront Plaza Corning NY 14831 (US)
Representative:	Anderson, James Edward George Elkington and Fife LLP Prospect House 8 Pembroke Road Sevenoaks, Kent TN13 1XR (GB)
Appellants II: (Opponents)	Rauh, Peter A. Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 4 81675 München (DE)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 23 November 2012 maintaining European patent No. 1036048 in amended form.**

Composition of the Board:

Chairman	H. Engl
Members:	J.-M. Schwaller
	O. Loizou

Summary of Facts and Submissions

I. The present appeals lie from the interlocutory decision of the opposition division to maintain European patent No. 1 036 048 in amended form on the basis of the set of claims according to auxiliary request 1 dated 1 October 2012, with independent claim 1 reading:

"*1. A method of firing a green ceramic honeycomb structural body containing a predetermined amount of sinterable raw materials, including an amount of a carbonaceous material, capable of yielding a fired honeycomb body, characterised in that the method comprises firing the green honeycomb structural body in a firing atmosphere to a temperature and for a time sufficient to initiate and sufficiently achieve release of the carbonaceous material while introducing into the firing atmosphere a fluorine-free low-oxygen gas comprising less than 20% O_2 by volume, and wherein the introduction into the firing atmosphere of the fluorine-free low-oxygen gas comprising less than 20% O_2 by volume involves removing any products of combustion, including the released carbonaceous material, treating the products of combustion with an afterburner to burn any partially reacted or unreacted carbonaceous material in the products of combustion and reintroducing the treated products of combustion back into the firing atmosphere*."

II. Relevant for the present decision are documents:

D4: US 5 183 609 A

D5: DE 3 232 294 C1.

III. In the contested decision, the opposition division rejected the main request (claims as granted) on the grounds of Article 123(2) EPC, because multiple back-references in dependent claims 3 to 12 gave rise to specific combinations of features which had no basis in the application documents as originally filed.

According to the opposition division, the claims of the auxiliary request were novel. D4 was considered as representing the closest state of the art. The problem to be solved consisted in providing an alternative process for introducing a low-oxygen gas to a firing process of honeycomb structural bodies. The solution as defined in claim 1 as maintained involved an inventive step because D5 did not disclose or suggest the provision of such a low-oxygen gas.

IV. With its statement of grounds of appeal dated 28 March 2013, the patent proprietor ("appellant I") filed two sets of claims as a main (claims as granted) and an auxiliary request. Claims 1 of both requests are identical and correspond to claim 1 as maintained by the opposition division (see point I above).

V. In its statement of grounds of appeal dated 2 April 2013, the opponents ("appellants II") addressed the grounds for opposition under Article 100(a) and (c) EPC. They argued that dependent claims 9 and 10 as maintained infringed Article 123(2) EPC and that claim 1 as maintained lacked inventive step over the disclosure of document D5 taken alone or in combination with the teaching of document D4. Claim 1 as maintained also lacked an inventive step starting from document D4 as the closest state of the art combined with document D5. Appellants II also requested that the appeal fee be reimbursed.

VI. With a letter dated 20 August 2013, appellants II raised objections under Article 123(2) EPC against dependent claims 3 to 12 of the main request.

VII. The appellant I filed with its reply dated 20 August 2013 further written submissions and auxiliary requests 2 to 4. With its letter dated 8 June 2015, auxiliary requests 5 to 8 were submitted.

Claim 1 of auxiliary request 2 reads as follows:

"*1. A method of firing a green ceramic honeycomb structural body containing a predetermined amount of sinterable raw materials, including an amount of a carbonaceous material, capable of yielding a fired honeycomb body, characterised in that the method comprises firing the green honeycomb structural body in a firing atmosphere to a temperature and for a time sufficient to initiate and sufficiently achieve release of the carbonaceous material while introducing into the firing atmosphere a fluorine-free low-oxygen gas comprising less than 20% O_2 by volume, and wherein the introduction into the firing atmosphere of the fluorine-free low-oxygen gas comprising less than 20% O_2 by volume involves removing any products of combustion, including the released carbonaceous material, treating the products of combustion with an afterburner to burn any partially reacted or unreacted carbonaceous material in the products of combustion and reintroducing the treated products of combustion back into the firing atmosphere,* ***and wherein the fluorine-free low-oxygen gas is introduced at a rate whereby the resulting firing atmosphere comprises less than 12% O_2 during at least a portion of the carbonaceous material release***."

Claim 1 of auxiliary request 3 reads as follows:

"*1. A method of firing a green ceramic honeycomb structural body containing a predetermined amount of sinterable raw materials, including an amount of a carbonaceous material, capable of yielding a fired honeycomb body,* ***in a tunnel kiln,*** *characterised in that the method comprises firing the green honeycomb structural body in a firing atmosphere to a temperature and for a time sufficient to initiate and sufficiently achieve release of the carbonaceous material while introducing into the firing atmosphere of the fluorine-free low-oxygen gas comprising less than 20% O_2 by volume, and wherein the introduction into the firing atmosphere a fluorine-free low-oxygen gas comprising less than 20% O_2 by volume involves removing any products of combustion, including the released carbonaceous material, treating the products of combustion with an afterburner to burn any partially reacted or unreacted carbonaceous material in the products of combustion and reintroducing the treated products of combustion back into the firing atmosphere,* ***and wherein the fluorine-free low-oxygen gas is introduced at a rate whereby the resulting firing atmosphere comprises less than 12% O_2 during at least a portion of the carbonaceous material release.***"

VIII. In further written submissions received with letters dated 17 March 2014 and 3 July 2015, appellants II requested that auxiliary request 4 to 8 not be admitted into the appeal proceedings. They put forward arguments contesting the inventive step of the subject-matter claimed therein in view of a combination of D5 with D4 or, alternatively, D4 with D5.

IX. At the oral proceedings inventive step was discussed. Appellants II argued that document D4 represented the closest state of the art. The subject-matter of claims 1 of the main request and auxiliary requests 1 to 3 lacked inventive step in view of D4 taken in combination with D5.

Appellant I filed a new auxiliary request 4A in replacement of auxiliary request 4 on file. In said new request 4A, the back-references in dependent claims 3 to 5 and 8 to 12 were amended, but claim 1 remained identical to claim 1 of auxiliary request 4. Both parties requested that the case be remitted to the first instance if the board decided to admit this new auxiliary request into the appeal proceedings.

Claim 1 of auxiliary request 4A reads as follows:

"*1. A method of firing a green ceramic honeycomb structural body containing a predetermined amount of sinterable raw materials, including an amount of a carbonaceous material, capable of yielding a fired honeycomb body, characterised in that the method comprises firing the green honeycomb structural body in a firing atmosphere to a temperature and for a time sufficient to initiate and sufficiently achieve release of the carbonaceous material while introducing into the firing atmosphere a fluorine-free low-oxygen gas comprising less than 20% O_2 by volume, and wherein the introduction into the firing atmosphere of a the fluorine-free low-oxygen gas comprising less than 20% O_2 by volume involves removing any products of combustion, including the released carbonaceous material,* ***via an exhaust flue removal system that operatively communicates with a carbonaceous material release region of the firing atmosphere,*** *treating the products*

of combustion with an afterburner to burn any partially reacted or unreacted carbonaceous material in the products of combustion and reintroducing the treated products of combustion back into the firing atmosphere ***via a return/delivery system including: a heat exchanger which cools the gas to the appropriate temperature for redelivery, and a bypass line for the heat exchanger and air bleeds before and after the heat exchanger for controlling the temperature and amount of treated products of combustion delivered to the release region***."

X. After closing the debate, the chairman established the parties' requests to be as follows:

Appellant I requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, in the alternative, that the patent be maintained in amended form on the basis of the claims of auxiliary request 1 filed with the grounds of appeal, or on the basis of the sets of claims of one of of auxiliary requests 2 or 3, filed with letter dated 20 August 2013, or on the basis of the set of claims of auxiliary request 4A, filed during the oral proceedings, or on the basis of one of the set of claims of auxiliary requests 5 to 8, filed with letter dated 8 June 2015.

Appellants II requested that the decision under appeal be set aside and that the patent be revoked. Additionally, reimbursement of the appeal fee was requested.

Reasons for the Decision

1. Main request - inventive step

By applying the problem-solution approach, the board came to the conclusion that the subject-matter of claim 1 of this request does not involve an inventive step, for the following reasons:

1.1 The patent in suit relates to a process for firing ceramic honeycomb bodies containing sinterable raw materials and carbonaceous materials.

1.2 Both parties argued at the oral proceedings that D4 represented the closest state of the art. For the board, D4 is indeed the best starting point to assess the inventive step of the claimed subject-matter, since this document is concerned with the same technical field and addresses the same problem as the invention, namely the firing of green honeycomb bodies to obtain crack-free ceramic honeycomb bodies.

More specifically, D4 (claim 1) discloses a process for producing a honeycomb ceramic body, comprising in particular a firing step in which the oxygen concentration in the firing atmosphere is decreased in a range of temperatures which corresponds to the temperature range within which thermal decomposition of at least one component selected from the group consisting of moulding aids and pore-forming agents occurs. According to column 2, lines 23 to 25, of D4 the concentration of oxygen is decreased in the range of temperatures where such agents may be fired abruptly. According to column 3, lines 38 to 43, the decrease in the oxygen concentration may be effected in

particular by adding nitrogen to the combustion gas fed of the burner.

In contrast to claim 1 of the patent in suit as granted, D4 does not disclose a process step wherein the products of combustion of the firing step are treated with an afterburner to burn any partially reacted or unreacted carbonaceous material and are reintroduced into the firing atmosphere.

1.3 As to the problem underlying the contested patent, it consists (see paragraph [0011]) in the provision of an improved method for firing ceramic honeycomb structural bodies, which permits the production of ceramic bodies exhibiting fewer cracks, non-uniform pores or non-uniform dimensions in a short time by uniformly firing the inner and outer portions of the green honeycomb structural bodies.

1.4 As a solution to this problem, the contested patent proposes a process according to claim 1 at issue, which is in particular characterised in that the products of combustion of the firing step are treated with an afterburner to burn any partially reacted or unreacted carbonaceous material and the treated products are reintroduced into the firing atmosphere.

Regarding the question whether the problem identified in the patent itself (cf. point 1.3 above), the parties agreed that it had already been solved by the process according to D4.

Appellant I argued that, starting from D4, the objective problem was however not merely to provide an alternative process for reducing the oxygen

concentration in the gas to be introduced in the firing atmosphere, but an improved one.

1.5 The board cannot accept this formulation. In the examples of the contested patent, the reduction of oxygen concentration in the firing atmosphere is obtained by introducing a nitrogen-rich gas, i.e. in the same way as in D4. Although the board has no doubts that the process as claimed can be put into practice, in the absence of any objective comparison with the closest state of the art D4, an improvement cannot be acknowledged. As a consequence thereof, the problem must be seen as the provision of an alternative process for producing crack-free fired ceramic honeycomb structural bodies from green bodies including sinterable raw materials and carbonaceous materials.

1.6 As to the question of obviousness, it has to be determined whether the proposed solution was obvious in the light of the state of the art, in particular in view of document D5 which appellants II considered to be particularly relevant.

1.6.1 D5 discloses (column 1, line 56 to column 2, line 46) a process for sintering ceramic bodies, in particular soft ferrites, in a kiln whose atmosphere is electrically heated and continuously circulated at least in the phase during which the organic binders escape from the green ceramic bodies. The firing atmosphere is heated and circulated outside the kiln chamber, so that the volatilised binders are continuously burned outside the kiln chamber, and the combustion gases thus generated are recirculated back to the kiln, so that only the excess quantity of gas is discharged from the circulation loop. In this way, the risk of deflagration or explosion in the closed kiln

chamber is reliably avoided. In addition, a more uniform temperature distribution is obtained in the kiln chamber, so that the ceramic bodies no longer crack or disintegrate (column 2, lines 3 to 11 and 57 to 68) due to the great quantity of volatile and combustible binders liberated during this phase.

1.6.2 For the board, the subject-matter of claim 1 as granted differs from D5 in that the ceramic body is in the form of a honeycomb structural body.

Appellants II argued that the recirculated combustion gases in the process according to D5 did not necessarily comprise less than 20% O_2 by volume. The board cannot accept this argument because, as can be seen from the process disclosed e.g. in D4, when the O_2 concentration in the firing atmosphere is not deliberately decreased and when no recirculation and combustion of the volatilised binder products occurs in the phase at which the binders volatilise, i.e. between 200 and 300°C, the atmosphere already consists of a low-oxygen gas comprising respectively 19 and 18% O_2 (see D4: Tables I and II, sample No. 3). This means that if this atmosphere was recirculated after treatment in an afterburner - as in the firing process of document D5 - the oxygen concentration in the recirculated gas would inevitably be lower than the value of "20% O_2 volume" defined in claim 1 at issue.

1.6.3 It follows from the above considerations that the skilled person would realise that the recirculated gas which led to a crack-free ceramic body in D5 contained less than 20% O_2. Therefore, the skilled person would have had a clear incentive to use this readily available recirculated low-oxygen gas, instead of nitrogen gas, in order to lower the oxygen content of

the firing atmosphere in the process disclosed in document D4, thereby arriving at the subject-matter of claim 1 at issue. Therefore, the subject-matter of said claim lacks inventive step within the meaning of Article 56 EPC.

2. The above conclusion also applies to claims 1 of auxiliary requests 1 and 5, which have the same wording as claim 1 of the main request, and which therefore likewise do not meet the requirements of Article 56 EPC.

3. Auxiliary request 2 - inventive step

3.1 Claim 1 of this request differs from claim 1 of the main request in that the fluorine-free low-oxygen gas "*is introduced at a rate whereby the resulting firing atmosphere comprises less than 12% O_2 during at least a portion of the carbonaceous material release*."

3.2 For the board, this feature does not make any inventive contribution to the claimed subject-matter because it is also part of the firing process according to document D4. As can be seen from tables 1 and 2, the firing atmosphere in the temperature zone of 200°C to 300°C, i.e. during "at least a portion of the carbonaceous material release", has an O_2 concentration between 6% and 10% (Tables 1 and 2; samples No. 1 and 2), and is clearly below 12% O_2 for the samples prepared according to a firing process in which the oxygen content of the firing atmosphere has been deliberately decreased and in which the volatilised binders have been combusted and recirculated.

3.3 Since this claim feature is part of the process according to document D4, the reasons in points 1.1 to

1.7.3 above apply likewise to claim 1 of this request, which therefore does not meet the requirements of Article 56 EPC.

4. The above conclusion also applies to claim 1 of auxiliary request 6, which has the same wording as claim 1 of this request, and which therefore also does not meet the requirements of Article 56 EPC.

5. Auxiliary request 3 - inventive step

5.1 Claim 1 of this request differs from claim 1 of auxiliary request 2 in that the firing process is carried out "*in a tunnel kiln*".

5.2 For the board, this feature does not make any inventive contribution to the claimed subject-matter, since in document D4 the firing process is likewise carried out in a tunnel furnace (D4: column 4, lines 2 to 6).

This feature being disclosed in D4, the reasons in points 1.1 to 1.7.3 above apply likewise to claim 1 of this request, which therefore does not meet the requirements of Article 56 EPC.

6. The above conclusion also applies to claim 1 of auxiliary request 7, which has the same wording as claim 1 of this request, and which therefore also does not meet the requirements of Article 56 EPC.

7. Admissibility of auxiliary requests 4 and 4A

7.1 The board observes that appellant I did not file auxiliary request 4 with its grounds of appeal, but some months later, namely on 20 August 2013.

The board does not consider the filing of this request to be late, because it has to be seen as a reply to the appeal of appellants II and an attempt to overcome the objections raised in their statement of grounds of appeal. Moreover the appellants II had sufficient time to respond after 20 August 2013.

Thus the board does not see a violation of Article 12(2) and (4) RPBA and it also exercises its discretion under Article 13(1) RPBA and admits auxiliary request 4 into the proceedings.

7.2 Since auxiliary request 4A differs from auxiliary request 4 only in that some of the back-references in dependent claims 3 to 12 have been modified, the board considers the filing of these modifications as an attempt to overcome certain pending issues under Article 123(2) EPC (see decision of the opposition division, Reasons, points 3.1 to 3.8 and the appeal brief of appellants II, dated 2 April 2013, points 1.1 and 1.2). Since these modifications do not concern claim 1 and since auxiliary request 4A replaces auxiliary request 4, the same reasons as in point 7.1 above apply regarding the admissibility of this request. Hence it is admitted into the appeal proceedings.

8. Reimbursement of the appeal fee

8.1 According to Rule 103(1)(a) EPC, the appeal fee is to be reimbursed where the board of appeal deems the appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation.

8.2 In the case at issue, appellants II argued that a substantial procedural violation had occurred because the opposition division did not allow them at the oral proceedings to fully present their arguments on inventive step starting from document D5, thereby denying them their right to be heard.

8.3 According to points 6 and 7 of the minutes of the oral proceedings, the opponents were invited to identify the closest state of the art for the inventive-step discussion. They explained that both D4 and D5 could individually be considered as a starting point, and stated that they would specifically attack inventive step on D4 combined with D5, D5 alone and D5 combined with D4. After having presented their first approach based upon document D4 as the closest state of the art, the chairman announced that the subject-matter of claim 1 of the auxiliary request 1 involved an inventive step and, based on the arguments put forward by the parties in the previous discussion, that D5 could not be considered as a second closest state of the art. Thereafter the chairman closed the debate.

8.4 For the board, the attitude of the opposition division cannot be seen as a substantial procedural violation within the meaning of Rule 103 EPC because, in the assessment of inventive step according to the problem-solution approach, one of the steps is to identify the **closest** state of the art and to decide on this issue. The opposition division followed this approach by inviting the parties to provide their arguments regarding the identification of the closest state of the art. The opposition division then decided that D4 represented the closest state of the art after having heard the parties on this issue, so that the opponents' right to be heard has not been violated in this

respect.

The board considers that even if the conduct of the opposition division at the oral proceedings were to be seen as a procedural violation, a reimbursement of the appeal fee would nevertheless not be equitable because the appellants II before the board of appeal no longer put forward their argument that D5 was closer to the claimed invention than D4. In fact, appellants II now argued - under an identical factual framework - that D4 represented the closest state of the art.

The appellants' request is therefore refused.

9. Auxiliary request 4A - remittal

The amendments in claim 1 of auxiliary request 4A introduce new apparatus features, defining in particular a return/delivery system including

- a heat exchanger which cools the gas to the appropriate temperature for redelivery,
- a bypass line for the heat exchanger, and
- air bleeds before and after the heat exchanger for controlling the temperature and amount of treated products of combustion delivered to the release region.

The introduction of these features, taken from the description, tends to shift the discussion of inventive step to technical and legal issues which have not yet been discussed by the first instance. In view of the above, and in view the requests of both parties for a remittal, the board exercises its discretion pursuant to Article 111(1) EPC to remit the case to the first instance for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of the claims of auxiliary request 4A, filed during oral proceedings.

3. The request of appellants II for reimbursement of the appeal fee is refused.

The Registrar: The Chairman:

C. Vodz H. Engl

Decision electronically authenticated