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**Datasheet for the decision
of 8 July 2009**

Case Number: T 1276/07 - 3.3.09

Application Number: 96900440.7

Publication Number: 0816065

IPC: B32B 18/00

Language of the proceedings: EN

Title of invention:
Ceramic structure

Patentee:
IBIDEN CO, LTD.

Opponent:
SAINT-GOBAIN CENTRE DE RECHERCHES ET D'ETUDES EUROPEEN

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Subject-matter of granted claims: Inventive step (yes)"

Decisions cited:
T 0936/96

Catchword:
-



Case Number: T 1276/07 - 3.3.09

DECISION
of the Technical Board of Appeal 3.3.09
of 8 July 2009

Appellant: SAINT-GOBAIN CENTRE DE RECHERCHES ET D'ETUDES
(Opponent) EUROPEEN
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office orally announced
4 April 2007 and posted 20 June 2007 and
rejecting the opposition filed against European
patent No. 0816065 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. Kitzmantel
Members: W. Ehrenreich
K. Garnett

Summary of Facts and Submissions

- I. Mention of the grant of European patent No. EP-B 0 816065 in respect of European patent application No. 96 900 440.7, filed on 12 January 1996 as International application No. PCT/JP96/00042 and published on 17 July 1997 as WO-A 97/025203, was announced on 12 November 2003 (Bulletin 2003/46).

The patent, entitled "*Ceramic Structure*", was granted with ten claims, Claim 1 reading as follows:

"1. A ceramic structural body comprising an assembly of plural united ceramic members each having a plurality of through-holes arranged side by side along a longitudinal direction, in which end faces at either side of these through-holes are closed in a checkered pattern so as to have a reverse relation of open and close between gas inlet side and gas outlet side and adjacent through-holes are permeable to each other through porous partition walls, **characterized in that** a plurality of the ceramic members are integrally adhered by interposing a sealing member of an elastic material consisting of at least inorganic fibers, an inorganic binder, an organic binder and inorganic particles and mutually bonded three-dimensionally intersected inorganic fibers and inorganic particles through the inorganic binder and organic binder between the mutual ceramic members."

Claims 2 to 10 are, either directly or indirectly dependent on Claim 1.

II. An opposition against the patent was filed by

Saint Gobain Centre de Recherches et d'Etudes Européen

on 10 August 2004.

The opposition was based on the opposition grounds that the claimed subject-matter lacked an inventive step (Article 100(a) EPC), that the invention was insufficiently disclosed (Article 100(b) EPC) and that the subject-matter of the European patent extended beyond the content of the application as filed (Article 100(c) EPC).

The objection under Article 100(c) EPC that the amendment in Claim 1 as granted (page 8, line 37 of the patent specification) to "inorganic fibers" (emphasis by the Board) vis-à-vis the corresponding feature "organic fibers" in Claim 1 of the EP-A publication contravened Article 123(2) EPC was later withdrawn. The Opponent accepted the declarations of Mr Ogawa, E1, and Mr Uchida, E2, submitted by the Proprietor with the letter dated 2 March 2007, that the correct translation from Japanese into English of the corresponding feature in the original PCT/JP application was "inorganic fibers".

In support of its objections as to lack of inventive step the Opponent, *inter alia*, referred to the following documents:

- A2 JP-A 7-54643 and English translation
- A6 JP-A 55-94976 and English translation
- A19 JP-A 5-213618 and English translation.

By its letter dated 2 March 2007 the Proprietor submitted, in addition to the declarations E1 and E2, further documents, *inter alia*:

- E7 Affidavit of Mr Oshimi comprising a test report comparing the fiber orientation in a sealing material with and without an organic binder
- E9 JP-A 57-5429 and English translation.

III. With its decision orally announced on 4 April 2007 and issued in writing on 20 June 2007 the Opposition Division rejected the opposition.

In the Opposition Division's view, the invention was sufficiently disclosed and did therefore not contravene Article 83 EPC. It was argued that the reference in Claim 1 of the patent to an elastic material should be interpreted in the light of paragraph [0038] of the patent specification. No reason was seen why a skilled person should not be able to provide a sealing member which is capable of yielding under stress to an extent such as to perform the stress buffering function in the claimed ceramic body. No reason could be seen either why a skilled person should not be able to provide a sealing member wherein the intersection points of the fibers occupy a three-dimensional volume.

Concerning the issue of inventive step, A2 was considered representative of the closest prior art, the difference being that the sealing member as defined in Claim 1 of the patent involved an organic binder. The Opposition Division saw no other document which, in combination with A2, would induce a skilled person to

add an organic binder to the sealing member of A2 in order to overcome the state of the art problems mentioned in paragraphs [0013], [0015], [0017] and [0022] of the patent specification.

IV. On 1 August 2007 the Opponent (hereinafter: the Appellant) lodged an appeal against the decision of the Opposition Division. The Statement of the Grounds of appeal was submitted on 19 October 2007.

With respect to the issue of inventive step, further documents A28 to A31 were filed in order to provide, in addition to the objection based on a combination of A2 and A6, a second approach starting from A19 as the closest prior art.

This second approach, however, was not pursued in the oral proceedings before the Board, held on 8 July 2009.

The objection of insufficiency of disclosure raised in the previous opposition proceedings was not repeated.

V. By its letter of reply filed on 25 April 2008 the Proprietor (hereinafter: the Respondent) contested the Appellant's arguments as to lack of inventive step. Enclosed with its letter dated 25 May 2009 the Respondent filed three sets of claims as bases for auxiliary requests 1 to 3. A test report was filed with the letter of 24 June 2009 which was corrected, in reaction to a fax communication of the Board dated 30 June 2009, by submitting a replacement page 3 with the fax dated 30 June 2009.

The auxiliary requests are not discussed in what follows because, as will become apparent, the appeal was in the event dismissed.

- VI. The Appellant argued that A2 represented the closest prior art, which disclosed a ceramic structural body in the sense of the claimed invention, comprising an assembly of plural united ceramic members integrally adhered by interposing a sealing member of an elastic filler material. It was further indicated in A2 that the sealing member was not necessarily present in paper form (page 16(e)) and could be formed by simultaneous extrusion with the slurry for forming the filter elements (page 16(f)) and that a heater element had not necessarily to be interposed between adjacent filter elements (page 17(g)).
- Therefore, the claimed structural body differed from that according to A2 only by the presence of an organic binder in the sealing member.

According to page 6 of A2 the filler served as an adhesive, was heat resistant and provided elasticity and heat conductivity. These features were also mentioned in paragraphs [0017], [0021] and [0022] of the patent specification.

Therefore, the problem to be solved was the provision of an alternative ceramic structural body.

The skilled person seeking to solve this problem would consider E9, whose disclosure was similar to that of A6 and which disclosed an adhesive for a heat resistant ceramic sheet on the basis of inorganic particles, inorganic fibers, a silica sol as inorganic binder and an organic binder which improved adhesion and

processability of the adhesive composition. The skilled person would therefore be induced by E9 to add an organic binder to the heat resistant filler of A2, thereby arriving at the claimed ceramic structure. With this measure the improved thermal conductivity, as shown by the Respondent's test report, was automatically reached and could not be regarded as an indication of the presence of an inventive step, in line with the decision T 936/96.

VII. The Respondent argued that, in view of the experimental report provided with the letter dated 24 June 2009, the objective technical problem to be solved was the improvement of the thermal conductivity, which was solved by the addition of the organic binder to the sealing composition, which provided a three-dimensional entanglement of the inorganic fibers as shown in figure A of E7 and a uniform particle distribution in the sealing member by preventing migration of the inorganic fibers/particles.

In contrast, according to A2 the heat-resistant filler was preferably provided in paper form by extruding the filler composition, which led to a bi-dimensional orientation of the inorganic fibers as depicted in figure B of E7.

There was no indication whatsoever, either in A6 or E9, which would prompt a skilled person to add an organic binder in order to address the problem of thermal conductivity.

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

IX. The Respondent requested that the appeal be dismissed, alternatively that the decision under appeal be set aside and the patent be maintained on the basis of the first to third auxiliary requests filed with the letter dated 25 May 2009.

Reasons for the Decision

1. The appeal is admissible.

2. *Inventive step*

2.1 *The patent in suit*

The patent is concerned with a ceramic structural body in the form of an assembly of plural united ceramic members, which is particularly suitable as a particle filter for the purification of diesel exhaust gases which pass through the filter members by means of a plurality of adjacent through-holes interconnected by porous partition walls allowing the passage of the gas from the point of entry into one through-hole to the point of exit in a neighbouring through-hole. It is desired that the ceramic structural body has an improved long-term durability when exposed to a high temperature load, because the filter has to withstand a large number of regeneration cycles including periodically burning and removing the particulate material accumulated on the partition walls of the filter (cf. patent specification, paragraphs [0001], [0005], [0024]).

According to the characterising part of Claim 1 as granted the plurality of the ceramic members is

assembled by interposing a sealing member consisting of inorganic fibers, an inorganic binder, an organic binder and inorganic particles.

2.2 *The closest prior art*

The document A2 is representative of the closest prior art. The Board concurs with the parties that A2 discloses a ceramic structural body in the form of an assembly of plural united ceramic members in the sense of the claimed invention from which the structural body as defined in Claim 1 of the granted patent differs in that the sealing member contains an organic binder.

2.3 *The problem to be solved*

It is common that any solution to a technical problem must normally satisfy various criteria, ie meet various requirements, in order to be feasible. In the present situation, it is apparent that the prime purpose of the sealing member is a durable joining of the ceramic members forming the filter assembly. This involves that the sealing material has good adhesion properties at room temperature (for fabrication) and high temperatures (in service). Since during regeneration the filter assembly is subjected to high temperatures necessary to remove the particulate material trapped therein a relatively high and uniform thermal conductivity of the sealing member is also mandatory in order to afford a high regeneration efficiency and mechanical durability.

In the present case it is uncontested that the sealing member fulfils the requirements of adhesiveness and

joining durability of the single ceramic members. Furthermore, the Respondent has demonstrated by its test report dated 24/30 June 2009 that the presence of an organic binder in the sealing member as defined in Claim 1 leads to a heat transfer between opposite sides of a filter element of a honeycomb filter assembly which is enhanced as compared with a sealing member according to A2 without organic binder (corrected page 3 and page 4 in conjunction with figures 7 and 8 of the experimental report).

Therefore, the objective technical problem to be solved vis-à-vis A2 is to be seen in the provision of a sealing member joining the ceramic members of a ceramic structural body which provides a high joining durability and adhesiveness as well as an enhanced thermal conductivity of the entire structural body.

2.4 *Obviousness*

It could be argued:

(i) that it was obvious that the use of an organic binder together with an inorganic binder would provide enhanced adhesiveness, having regard to A6 and E9 (A6: page 3, 3rd paragraph; page 6, to paragraph; E9: page 3, last paragraph to page 4, lines 1 to 3 and paragraph 4) relating to similar cement materials for similar purposes, and

(ii) that some cellulose polymers were known to prevent migration phenomena which lead to inhomogeneities in a ceramic mass, having regard to A28 ("Methylcellulose Polymers as Multifunctional Processing aid in Ceramics"

in Ceramic Bulletin, 1983, page 1282 "Binder Migration"; submitted with the Grounds of Appeal).

However, none of the citations comprises any information whatsoever with regard to the influence of organic binders on the thermal conductivity of a composition as specified in present Claim 1. Nor do these citations contain any hint about the influence an organic binder would have on the three-dimensional structure of the organic fibres and the ensuing distribution of the inorganic particles favourable to thermal conductivity.

In the Board's judgment therefore it is non-obvious to arrive at the claimed solution, irrespective of the fact that the prior art might suggest a partial solution of the underlying technical problem. This conclusion results from the fact that the prior art does not suggest the claimed solution in relation to one essential part of the underlying problem, namely the enhancement of the thermal conductivity.

Since the skilled person cannot deduce from the information referred to above with regard to A6/E9 and A28, or any other citation, any link between the properties adhesiveness and/or migration prevention on the one hand, and thermal conductivity on the other hand, any speculation concerning the possible obviousness of the improvement of the last mentioned property by the addition of an organic binder to the cement composition of A2 is based on hindsight.

The Appellant's reference to decision T 936/96 (point VI), with the argument that a skilled person

intending to improve adhesiveness by adding an organic binder in accordance with E9 would automatically improve the thermal conductivity of the assembled structure of A2, is besides the point. This argument is essentially based on the idea that the improved thermal conductivity is to be regarded as a bonus effect, not able to contribute an inventive step. However, such a conclusion is only justified in the case of a one-way situation, where the distinguishing feature (here: the addition of an organic binder) is the only way to attain the "main" objective (here: improved adhesiveness, migration prevention), a situation that does not apply here.

The subject-matter of Claim 1 as granted therefore involves an inventive step. This also applies to dependent Claims 7 to 10.

3. Consequently, the claims as granted are allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

G. Röhn

P. Kitzmantel