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**Datasheet for the decision
of 10 October 2008**

Case Number: T 0394/08 - 3.2.06

Application Number: 01992222.8

Publication Number: 1358373

IPC: D04H 1/00

Language of the proceedings: EN

Title of invention:

Aerogel composite with fibrous batting

Applicant:

Aspen Aerogels Inc.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

RPBA Art. 13(1)

Relevant legal provisions (EPC 1973):

EPC Art. 84

Keyword:

"Claims - clarity (no)"

"Amendments - added subject-matter (yes)"

"Late filed request - admitted (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0394/08 - 3.2.06

DECISION
of the Technical Board of Appeal 3.2.06
of 10 October 2008

Appellant:
(Applicant)

Aspen Aerogels Inc.
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Marlborough
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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 5 October 2007
refusing European application No. 01992222.8
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. Alting Van Geusau
Members: G. de Crignis
K. Garnett

Summary of Facts and Submissions

- I. By the decision posted on 5 October 2007 the examining division refused European patent application No. 01992222.8 for lack of novelty and inventive step.
- II. On 8 November 2007 the appellant (applicant) filed an appeal against this decision and simultaneously paid the appeal fee. A statement setting out the grounds of appeal was received at the European Patent Office on 4 February 2008.
- III. In a communication in the annex to the summons to oral proceedings, the Board questioned the clarity and the disclosure of the subject-matter of the claims filed with the grounds of appeal.
- IV. Oral proceedings were held on 10 October 2008.
- V. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed during the oral proceedings.
- VI. Claim 1 of the main request has the following wording:

"A composite article (20; 30; 40; 50; 60) comprising aerogel and a reinforcing structure to serve as a flexible, durable, light-weight insulation product formed by steps of:
- combining gel forming material with a reinforcing structure comprising a lofty fibrous batting (21; 51; 61) of a soft web of fibers in sheet form, wherein the fibers are oriented along all three axes, wherein the batting sheet (21; 51; 61) is compressible by at least

50% of its natural thickness and after compression for a few seconds springs back to at least 70% of its thickness,

- forming a gel, and
- drying the gel, wherein the cross-sectional area of the fibers visible in the cross-section of the composite article is less than 10% of the total cross-sectional area of the composite article."

The appellant further proposed to amend claim 1 so as to replace the expression "gel forming material" by "gel precursor", and to set the limits for the compressibility and spring-back both to 80%, if this would be considered appropriate by the Board.

VII. The arguments of the appellant may be summarised as follows:

Independent claim 1 is based on original claim 2 but formulated as a product-by-process claim. The combination of the features, namely that the fibrous batting sheet is compressible by at least 50% of its natural thickness and after compression for a few seconds springs back to at least 70% of its thickness and that the cross-sectional area of the fibres visible in the cross-section of the composite article is less than 10% of the total cross-sectional area of the composite article, is disclosed in the specification as originally filed, page 11, paragraph 3 to page 12, paragraph 2.

With respect to the determination of the compressibility/spring-back properties of the batting in the final product, it is to be noted that the fibre

reinforcement structure provides the substantial structure around which a continuous aerogel structure is developed and warrants a closer correlation between starting material properties and the end product.

The step of combining a gel-forming material with a reinforcing structure is disclosed in the specification as originally filed, page 7, paragraph 4 and figure 1.

The gel-forming step can be derived from the specification as originally filed, page 9, paragraph 4, where the transition of the sol to the gel state is mentioned. It is common knowledge in the art that formation of the gel comes after the sol state, after the gel-forming material or gel precursor has been poured over the reinforcing structure, so that a separate forming step is inherent in the procedure disclosed in the originally filed description.

Finally, the drying step is disclosed in the specification as originally filed, page 10, paragraph 2. In the art, the term "drying" is commonly understood to refer to the extraction of liquid or the removal of solvent from the gel. Other extraction techniques are also mentioned on page 1 in the last paragraph.

Reasons for the Decision

1. The appeal is admissible.
2. The main request was filed during the oral proceedings, hence at the latest possible stage in the proceedings. According to Article 13(1) of the Rules of Procedure of

the Boards of Appeal (RPBA), it lies within the discretion of the Board to admit such a late-filed request into the proceedings but one factor in the exercise of this discretion is whether the request is clearly allowable. Taking into account also the proposed additional amendments, this is not the case for the present request, for the following reasons.

2.1 The subject-matter of claim 1 lacks clarity (Article 84 EPC) because some of its features cannot be established in the final product.

2.1.1 The claim relates to a product, namely a composite article comprising an aerogel and a reinforcing structure in form of a lofty fibrous batting, and is drafted as a product-by-process claim. It is clear from the claim and the description, and has not been disputed by the appellant, that the features of compressibility and resiliency (spring-back after a few seconds) of the batting refer to its properties in the natural state, i.e. before its combination with a gel precursor. However, it is not apparent that these properties can be assessed in a final composite article. Although it is possible to examine the structure, composition and density of the batting in the composite, it is not possible to determine its compressibility and resiliency in the composite independently of the aerogel matrix. There is no correlation between its density in the aerogel matrix and its compressibility/resiliency in its natural state. Moreover, since the batting may be compressed by up to 50% of its thickness after the gel forming material is poured in (cf. page 12, third paragraph of the description), without there being indicated a precise

or at least average value for such compression, it is impossible to state what thickness the batting originally had and whether from this (unknown) thickness it was compressible and resilient within the limits indicated in claim 1.

2.1.2 With respect to this issue, which in essence had already been raised in the Board's communication annexed to the summons to oral proceedings, the appellant argued that the properties of the reinforcing material around which the continuous aerogel structure is developed warrants a closer correlation between starting material properties and the end product. However, the appellant did not refute the Board's objection relating to the missing link between properties of the batting in its natural state and in the final product.

2.2 Furthermore, the amendments to claim 1 lead to subject-matter which was not disclosed in the application as filed, contrary to the requirement of Article 123(2) EPC. In particular the method steps "forming a gel" and "drying the gel" cannot be derived directly and unambiguously from the application as filed.

2.2.1 The passage of the description (page 9, paragraph 4) indicated by the appellant as a basis for the disclosure of the forming step describes the control of variables influencing the transition from the sol state to the gel state in an inorganic aerogel formation process. There is no suggestion that a separate forming step, as it is now defined in the claim, is performed independently of the combining step in order to trigger the formation of the gel. Rather the cited passage

implies that this transition occurs without the necessity of any further action and that it may be controlled by the aerogel formulation's constituents and the process parameters (i.e., pH, molar ratios of reactants).

The appellant did not refute the Board's arguments that the formation of the gel starts after all aerogel constituents have been mixed without the need of any further action by an operator. It was argued instead that it was the common knowledge of the skilled person in the field of aerogels that the aerogel formulation went from a sol state to a gel state, and that the onset of the gel state had a precise meaning and thus constituted a separate step. The Board does not dispute that gel formation may start only after a lapse of time. However, the execution of a separate forming step in the sense of a further action to be carried out, which could be for example the addition of a further gellation-triggering constituent to the batting/precursor combination, is not disclosed in the application; gel formation is the direct consequence of the mixing of all constituents of the aerogel formulation.

2.2.2 Furthermore, the description does not disclose a process step of drying the gel in general. The passage on page 1 refers to aerogels in general, not to a process of manufacture of a composite article, and mentions only that supercritical and subcritical fluid extraction technologies are commonly used to extract fluid from the pores of an aerogel. Other passages indicated by the appellant only refer to the removal or extraction of water or solvent from the pores of

inorganic gels under subcritical and supercritical conditions. According to page 10 of the description, water may be removed from the pores of the gel via exchange with a polar organic solvent. Alternatively, a solvent may be removed under subcritical conditions if the matrix materials are chemically modified in the wet gel state. Supercritical drying of silica aerogel monoliths (i.e. without a reinforcing material) is referred to on top of page 18, and subcritical and supercritical CO₂ extraction of alcoholic solvent from the pores of a silica aerogel is described in the preferred embodiment of EXAMPLE 1 on page 18. A basis for the feature "drying" in general, which encompasses other techniques than those mentioned above, was not identified by the appellant.

The appellant's argument that the treatments described in the cited passages would be understood by the skilled person in the field of aerogels as the process step of drying, are unconvincing. The Board does not dispute that the effect achieved by these treatments may be commonly referred to as drying of an inorganic aerogel. However, the collection of treatments disclosed is not necessarily a complete list of possible drying treatments, so that the expression "drying the gel" covers a broader field of treatments than originally disclosed. Moreover, the claim is not limited to a specific type of aerogel, contrary to the embodiments taken as support for the disclosure of the drying step, which all are based on inorganic metal oxide, more specifically silica, aerogels. Hence, even under the assumption that the extraction methods mentioned in the description of the embodiments could be considered as a complete list of treatments for

drying silica aerogels, this is not necessarily the case for any type of aerogel.

- 2.3 For these reasons alone claim 1 is not clearly allowable. Therefore it was not admitted into the proceedings.
- 2.4 The further amendments to claim 1 proposed by the appellant do not change these conclusions, for the following reasons. The replacement of the limit values for the compressibility/resiliency of the reinforcing material cannot change the fact that these parameters cannot be assessed in the final product. Similarly, the replacement of the term "aerogel forming material" by "aerogel precursor" in the combining step has no effect on the Board's conclusion with respect to the lack of disclosure of the forming and drying steps of the claim.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

M. Patin

P. Alting van Geusau