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Datasheet for the decision of 15 September 2016

Case Number: T 2416/11 - 3.2.06

Application Number: 06022843.4

Publication Number: 1832729

IPC: F01N3/28

Language of the proceedings: EN

Title of invention:
Fiber sheet member and exhaust gas purifying device using the same as a support mat

Patent Proprietor:
Ibiden Co., Ltd.

Opponent:
3M Innovative Properties Company

Headword:

Relevant legal provisions:
EPC 1973 Art. 83
RPBA Art. 13(1)

Keyword:
Sufficiency of disclosure - unknown parameter - (no)

Decisions cited:

Catchword:

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Case Number: T 2416/11 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 15 September 2016

Appellant: (Opponent)	3M Innovative Properties Company 3M Center 2501 Hudson Road St. Paul MN 55144-1000 (US)
Representative:	Bergen, Katja Office of Intellectual Property Counsel 3M Deutschland GmbH Carl-Schurz-Str. 1 41453 Neuss (DE)
Respondent: (Patent Proprietor)	Ibiden Co., Ltd. 2-1, Kanda-cho, Ogaki Gifu 503-8604 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 27 September 2011 concerning maintenance of the European Patent No. 1832729 in amended form.**

Composition of the Board:

Chairman M. Harrison
Members: T. Rosenblatt
M.-B. Tardo-Dino

Summary of Facts and Submissions

I. The appellant (opponent) filed an appeal against the interlocutory decision of the opposition division in which the opposition division found that European patent No. 1 832 729 in an amended form met the requirements of the EPC.

II. In reply to the appeal grounds, the respondent (patent proprietor) submitted a main request, corresponding to the claims considered in the decision as complying with the requirements of the EPC, and two auxiliary requests.

III. The parties were summoned to oral proceedings before the Board. In a communication sent in preparation for the oral proceedings, the Board informed the parties of its preliminary opinion on the case. The Board expressed its doubts *inter alia* on whether the requirements of Articles 83 and 84 EPC 1973 were met.

IV. With its letter of 12 August 2016 the respondent submitted a new main request and auxiliary requests 1 to 4.

V. After having being notified by the Board that a copy of a photo, to which the respondent had referred in its arguments, was of very low quality, the respondent submitted a further copy with its letter of 1 September 2016.

VI. Oral proceedings were held on 15 September 2016.

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

VIII. The respondent requested that the patent be maintained with the claims according to the main request or according to auxiliary requests 1 to 4, all submitted with the letter of 12 August 2016.

IX. Claim 1 of the main request reads as follows:

"A sheet member (24) including inorganic fibers, in which sheet member a first surface (26) and a second surface (28) substantially facing away from each other are perpendicular to a direction of thickness of the sheet member (24);
wherein the first surface (26) has at least one lowest point and at least one highest point;
characterized in that a maximum difference between the lowest and the highest point of the first surface (26) h is 0.4 mm ≤ h ≤ 9 mm, wherein the sheet member (24) is formed by a needling process of a laminated sheet made of the inorganic fibers and said difference is controlled by the number of needle processing traces occurring due to the needling process."

X. In claim 1 of auxiliary request 1 the range of the parameter defined in its characterising portion has been amended to "3 mm ≤ h ≤ 7 mm".

XI. In claim 1 of auxiliary request 2, in addition to the change of the range introduced in auxiliary request 1, the designation of the subject-matter has been amended to read as follows:

"A sheet member (24) for use as a holding sealer such that the holding sealer is wound around an exhaust gas processing body (20) housed in a metallic shell (12) with a first surface of the holding sealer in close contact with an inner surface of the metallic shell

(12),
the sheet member (24) including inorganic fibers, in which...".

Additionally, at the end of claim 1, the following features have been added:

"wherein the sheet member (24) comprises organic binders in an amount of 1.0 to 10.0 weight percent, and wherein the inorganic fibers are a mixture of alumina and silica"

XII. Claim 1 of auxiliary request 3 reads:

"Use of a sheet member (24) including inorganic fibers, in which sheet member a first surface (26) and a second surface (28) substantially facing away from each other are perpendicular to a direction of thickness of the sheet member (24);
wherein the first surface (26) has at least one lowest point and at least one highest point;
wherein a maximum difference between the lowest and the highest point of the first surface (26) h is 3 mm ≤ h ≤ 7 mm, wherein the sheet member (24) is formed by a needling process of a laminated sheet made of the inorganic fibers and said difference is controlled by the number of needle processing traces occurring due to the needling process,
wherein the sheet member (24) comprises organic binders in an amount of 1.0 to 10.0 weight percent, and wherein the inorganic fibers are a mixture of alumina and silica,
as a holding sealer such that the holding sealer is wound around an exhaust gas processing body (20) housed in a metallic shell (12) with a first surface of the

holding sealer in close contact with an inner surface of the metallic shell (12)."

XIII. Claim 1 of auxiliary request 4 reads:

"An exhaust gas purifying device (10) comprising:
an exhaust gas processing body (20);
a holding sealer (15) used with at least a portion of outer surfaces of the exhaust gas processing body (20) except an open surface; and
a metallic shell (12) housing the exhaust gas processing body (20), the holding sealer (15) being wound around the exhaust gas processing body (20);
wherein the holding sealer (15) consists of a sheet member (24) including inorganic fibers, in which sheet member a first surface (26) and a second surface (28) substantially facing away from each other are perpendicular to a direction of thickness of the sheet member (24);
wherein the first surface (26) has at least one lowest point and at least one highest point;
wherein a maximum difference between the lowest and the highest point of the first surface (26) h is 3 mm ≤ h ≤ 7 mm, wherein the sheet member (24) is formed by a needling process of a laminated sheet made of the inorganic fibers and said difference is controlled by the number of needle processing traces occurring due to the needling process,
wherein the sheet member (24) comprises organic binders in an amount of 1.0 to 10.0 weight percent, and wherein the inorganic fibers are a mixture of alumina and silica, and
the holding sealer (15) is arranged such that the first surface (26) of the sheet member (24) is in close contact with an inner surface of the metallic shell (12)."

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

Main request

The skilled person was not able to carry out the invention defined by claim 1 because the patent *inter alia* did not disclose how the unusual parameter "maximum difference between the lowest and the highest point on the first surface" could be reliably determined based on the method disclosed in paragraph 26 of the patent. It was for example not specified by which method the samples had to be prepared, including how and along which directions the sheet member should be cut without modifying its surface. In particular it was not apparent how the lowest point or the highest point could be determined in a cut section. Not disclosing how to determine these points did not provide sufficient information to the skilled person to measure the maximum difference and thus to know whether he had actually carried out the invention.

Auxiliary request 1

The amendment of the range of the maximum difference did not change the crucial issues, such as the questions of how and where to cut, and how to determine a lowest point.

Auxiliary request 2

The request should not be admitted into the proceedings. It introduced new issues on which the appellant could not have been prepared to reply. That an amount of binder as low as 1.0 weight percent now

defined in claim 1 could have had an impact on the question whether or not the skilled person would be able to carry out the invention, i.e. to appropriately cut the probes and to find the lowest point, had never been part of the respondent's case. The appellant was unable at this late stage to verify this by appropriate testing.

Auxiliary requests 3 and 4

The appellant did not provide any additional comments.

XV. The arguments of the respondent may be summarised as follows:

Main request

The roughness of a surface was a well known parameter for needled fibrous sheets. The description of the method in paragraph 26 of the patent allowed the skilled person to measure the surface's unevenness. It belonged to common general knowledge of the skilled person to select appropriate cutting methods not damaging the surface, and to select appropriate imaging technology to analyse the cut sections. By doing so for a probe set of ten arbitrarily cut sections and averaging the obtained measured differences between highest and lowest points, as set out in paragraph 26, the unevenness could be reliably calculated. Analysing the images required a consideration of only the macrostructure of the surface, single needle holes or the bulging immediate surrounding surface would not have to be considered and their effects on the unevenness were anyway eliminated by the averaging. The cut sections, which could be made appropriately thin,

would be imaged against a black background thereby clearly showing the waviness of the surface structure.

Auxiliary request 1

The limitation of the range for "h" meant that only big differences had to be measured, which required less accuracy in the determination of the parameter. Such bigger height differences could be easily and reliably determined in the images, allowing the skilled person to know whether one was working inside or outside the scope of the claim.

Auxiliary request 2

The added feature relating to the binder in claim 1 was a response to objections raised for the first time by the Board. That it addressed in particular the issue of Article 83 EPC was also apparent from the respondent's accompanying letter of 12 August 2016 and could thus not come as a surprise for the appellant. It replied in particular to the concerns raised in regard to the stability of samples when cut as thin slices. The binder, even in the lowest percentage part of the range, sufficiently stabilised the fibre sheet, avoiding altering the structure of the surface and allowing the samples to be correctly analysed. That it was possible to produce and precisely analyse such cut sections of a fibre sheet was demonstrated by the examples shown in the patent, the photo provided as well as by the preferred embodiment of prior art D5.

Auxiliary request 3 and 4

In the oral proceedings the respondent did not provide any additional comments.

Reasons for the Decision

Main Request

1. The invention defined in claim 1 is not disclosed in a manner sufficiently clear and complete for it to be carried out by the person skilled in the art, contrary to the requirement of Article 83 EPC 1973, for the following reasons.

2. Claim 1 defines in the characterising portion that the "maximum difference between the lowest and the highest point of the first surface" of the needled fibre sheet shall be within a certain range.

3. In order to carry out the invention defined in claim 1 the skilled person must therefore be able to reliably determine this parameter. To do so, he must know an appropriate measurement method.

4. The respondent did not provide any evidence for its contention that the parameter defined in claim 1 was known in the technical field of needled fibre sheets. There is also no evidence that this parameter would correspond to commonly known "roughness" of solid body surfaces and that it would be determined by corresponding methods. The respondent also referred to the parameter as "waviness" or "unevenness" of the surface. Notwithstanding that waviness or unevenness is not something defined in claim 1, evidence that these would belong to the common general knowledge of the skilled person in the relevant field has also not been provided.

5. Although the determination of "h" appears to be based on a seemingly simple determination of a height difference, a skilled person is not enabled to do so without knowing how to determine the lowest and highest points of a needled sheet's surface.

5.1 When examining such a surface on a scale corresponding to the fibre diameter, it represents a rather irregular structure, determined by individual fibres, whereas on a somewhat larger scale an enveloping surface formed by the totality of fibres running at or to the surface is observed. On this larger scale, the surface may also present a three-dimensional, more or less "uneven" structure. Since the fibre sheet is obtained *inter alia* by a needling process, needle holes or craters can be observed on such larger scale, determining (at least locally) the surface structure. In addition, depending on the actual needling (and further processing) conditions, a structure presenting other three-dimensional characteristics, such as an overall wavy topology, may result. The depth of needle holes or craters will generally be different than the depth of the valleys constituting the lowest points of such a resulting overall uneven topology, as also argued as such by the respondent.

5.2 The Board can accept, as argued by the respondent, that the skilled person would not consider a single tip of a fibre projecting from an otherwise more or less smooth but "uneven" fibre sheet surface as corresponding to a highest point within the meaning of the claim. The skilled person would thus not determine lowest and highest points of the surface on a strictly microscopic scale of individual fibres. The skilled person would rather look at the surface on a bigger scale at which a plurality of fibres determines its structure.

5.3 The Board nevertheless finds that it remains unclear whether even on such bigger (nevertheless undetermined) scale a lowest point according to claim 1 would be considered to be formed by a valley of an overall uneven structure, disregarding for example the individual needling holes or whether even the deep end of a needling hole should be considered as defining a lowest point. These different lowest points would clearly lead to different results for "h", contrary to the requirement for a reliable determination of this unknown parameter.

6. The appellant referred to paragraph 26 and to Figure 1 of the patent, arguing that the method described therein would allow the skilled person to reliably determine the parameter defined in claim 1.

6.1 Paragraph 26 discloses a method for determining a "maximum unevenness difference h" based on the calculation of an average from ten measurements. The latter shall be made in images of ten respective cross sections taken at any position of the sheet member, where the distances between a "most re-entrant position" and a "most salient position" in each of the cross sections shall be measured. The Board finds nevertheless that paragraph 26 does not disclose how to identify in such images the lowest or most re-entrant position of the first surface in a cut cross section, so that the teaching of the patent remains incomplete in this respect.

6.2 Moreover, since there is no indication in paragraph 26 on how to select the cross sections, the result obtained after averaging the ten samples is entirely arbitrary. For example, if in one test the cut cross

sections do not contain any needle craters or holes, the result would be entirely different to that obtained from a set of images in which such one or several images contained craters or deep needling holes. That the final result would be the same due to the averaging, as argued by the respondent, cannot be accepted by the Board. Even if the skilled person might consider selecting, in some undefined way, appropriately sized and selected cross sections, the patent is simply moot as to whether craters or needle holes should be taken into account or not when averaging. And the average calculated, if craters and/or ends of needle holes would have to be considered, depends strongly on the number of such structures in the set of measurement values. Without any indication as to whether or not, and to which extent, to consider such structures in the resulting average, the calculated value remains arbitrary and therefore no reliable determination can be made.

6.3 By referring to Figure 1, the respondent argued that the skilled person would only have considered the "overall" wavy structure. The maximum difference of such wavy structure could be readily determined as could be seen in the copy of the photograph, submitted again in preparation for the oral proceedings before the Board, allegedly corresponding to what is shown in Figure 1 of the patent.

The Board also does not accept this argument. The schematic drawing of a wave structure in Figure 1 would not have taught the skilled person anything in respect of how to select the relevant points in a real surface. Neither the sheet member according to claim 1 nor the preferred embodiments disclosed in the description contain any information that such wave structure should

necessarily be obtained.

6.4 There also appear to be many other difficulties the skilled person has to face when trying to carry out the method described in paragraph 26 in order to be able to reproduce an article falling under claim 1, which would result in an undue burden when trying to perform the invention.

These concern for example the question of how to cut a needled fibre sheet made of inorganic fibres, impregnated or not with a binder composition, without damaging or altering its surface structure. Similarly, even in the photograph submitted by the respondent it is still unclear whether the lowest point seen there in the contour of the (white/light grey) fibre sheet photographed against a black background is actually the lowest point in the cross section or whether the valley referenced therein corresponds to some surface profile behind the cut cross section (since the cut sample has always a finite extension perpendicular to the cross section). The real lowest point could be in the cutting plane, lower than the contour profiling against the dark background, but not recognisable due to the missing contrasting dark background. Whilst the respondent argued that this was speculation, the Board however sees this otherwise since the particular location of the cut, as even argued by the respondent, has not been selected so as to coincide with a lowest point, but at random as required by the patent.

The patent does not give any details in respect to these questions. In the Board's view and contrary to the respondent's arguments, it requires more than the common practice of the skilled person, exceeding simple trial and error, to carry out the method in paragraph

26, and thereby to determine the critical parameter with anything but a pure arbitrary result, and thus to carry out the invention defined in claim 1.

7. The fact that the respondent was able to produce such samples and, according to its measurements, reliably measure the parameter, even on sheet members produced according to the prior art, does not contradict the above conclusions because the respondent is seemingly in possession of all this missing knowledge.

8. In the absence of a sufficient and complete disclosure of a method allowing the skilled person to reliably determine the parameter defined in claim 1, the Board concludes that the skilled person is not able to carry out the invention defined therein, contrary to the requirement of Article 83 EPC 1973.

9. Therefore the patent cannot be maintained on the basis of the main request.

Auxiliary request 1

10. In claim 1 of this auxiliary request, the claimed range for the maximum difference, h, has been restricted from previously "0.4 mm ≤ h ≤ 9 mm" to "3 mm ≤ h ≤ 7 mm". This amendment however does not overcome the objection regarding lacking sufficiency of disclosure, in particular in view of the lack of disclosure on how to determine, in particular, the lowest point in the first surface. The reasoning given in regard to the main request thus applies equally.

11. The respondent's argument that the amendment entailed a determination of the parameter requiring less accuracy, avoiding in particular the need for a precise

measurement of h at the lower end of the range, which could thus be reliably carried out by the skilled person, is found unconvincing. Even in the remaining range which covers values an order of magnitude higher than the previous lower boundary, the measurement of the parameter relies on the determination of the lowest and highest points of the surface. In the absence of any information on how to select in particular a lowest point, including the missing information on how and exactly where to cut cross sections and analyse images, the outcome of the test procedure still remains arbitrary.

12. Consequently, the requirement of Article 83 EPC 1973 is not met, so that the patent cannot be maintained on the basis of auxiliary request 1 either.

Auxiliary requests 2 to 4

13. Similarly to the main request and auxiliary request 1, auxiliary requests 2 to 4 were filed after the time limit for filing the response to the appeal grounds (Article 12(1) and (2) RPBA) and therefore constitute an amendment to the respondent's case.

14. According to Article 13(1) RPBA, any amendment to a party's case may be admitted and considered at the Board's discretion. The discretion shall be exercised in view of inter alia the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

15. Contrary to the main request and auxiliary request 1, the appellant objected to the admittance of auxiliary request 2, arguing that it was not clear that this amendment could overcome the objection under Article 83

EPC 1973 and that it would raise issues which it could not have been expected to prepare for and appropriately respond to.

16. Claim 1 of auxiliary request 2 has been further amended, compared to that of auxiliary request 1, by introducing inter alia the feature "wherein the sheet member (24) comprises organic binders in an amount of 1.0 to 10.0 weight percent, and wherein the inorganic fibers are a mixture of alumina and silica". This feature is based in part on original and granted claim 3 and 5 and, in regard to the amount and type of binder, on paragraph 39 of the description as filed.

17. The amendment however does not *prima facie* overcome the outstanding objection under Article 83 EPC 1973. The definition of a further component of the fibre sheet cannot enlighten the skilled person on the crucial question of how to reliably determine the critical parameter h. It remains still unclear how to select the cross-sections and how to determine a lowest point of the surface.

18. The respondent argued that the binder even at a concentration as low as 1.0 weight percent had a stabilising effect on the sheet which allowed it to be cut without damaging or altering its surface, making it thus possible to prepare the samples thin enough and to reliably determine the maximum difference "h". This argument fails however because even if it could be shown that such sheets were sufficiently stable the question on how to determine the lowest points *prima facie c*ould still not be answered.

19. Moreover according to the letter of the respondent accompanying the submission of auxiliary request 2, the

above cited feature was originally not intended to address any issue under Article 83 EPC 1973. The last paragraph on page 3 of the letter of 12 August 2016, when read in context of the preceding paragraph clearly relates to an argument on inventive step. The argument that this feature would refute the appellant's objection concerning lack of disclosure on how to cut the samples without altering its surface structure, had been presented for the first time in the oral proceedings before the Board. The objection to the undisclosed cutting method had nevertheless been repeatedly argued in the written part of the procedure, without receiving any reply of the respondent in this sense. Besides the argument not being supported by any evidence, the appellant could not have been expected to deal with the respondent's change of case in the oral proceedings. The Board finds that it is highly probable, as also argued by the appellant, that further tests would be required concerning the question of whether cutting such sheet members without altering their surface structure would indeed be possible, and whether this would have finally thrown a different light on the question of sufficiency of disclosure. Since such data were not available, this issue could not have been dealt with during the oral proceedings. Likewise, how this could have provided an answer to the matter of where to cut the sections from a layer (i.e. close to or remote from needling locations) remained entirely unanswered in the context of achieving any degree of reliability, given that the patent explained that random locations were used

20. For these reason the Board exercised its discretion under Article 13(1) RPBA not to admit the request into the proceedings.

21. Auxiliary requests 3 and 4 include the same critical amendment as discussed before in regard to auxiliary request 2. The respondent did not argue, and the Board also cannot find, that the further amendments in claim 1 of auxiliary requests 3 and 4 would lead to a different conclusion compared to the previous auxiliary requests. The Board thus exercised its discretion under Article 13(1) RPBA not to admit auxiliary requests 3 and 4 into the proceedings.

22. In the absence of any request in proceedings which meets the requirements of the EPC, the patent is to be revoked (Article 101(3) b) EPC 1973.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

M. H. A. Patin M. Harrison

Decision electronically authenticated