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**Datasheet for the decision  
of 15 May 2012**

**Case Number:** T 1352/07 - 3.3.03

**Application Number:** 97117337.2

**Publication Number:** 837076

**IPC:** C08F 8/00, A61L 15/00

**Language of the proceedings:** EN

**Title of invention:**  
Water-absorbing agent and production process therefor

**Patentee:**  
NIPPON SHOKUBAI CO., LTD.

**Opponent:**  
BASF Aktiengesellschaft

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 83

**Relevant legal provisions (EPC 1973):**  
-

**Keyword:**  
"Sufficiency of disclosure - no - all requests"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 1352/07 - 3.3.03

**DECISION**  
of the Technical Board of Appeal 3.3.03  
of 15 May 2012

**Appellant:** NIPPON SHOKUBAI Co., LTD.  
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**Respondent:** BASF Aktiengesellschaft  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office announced on 25 January  
2007 and posted 21 June 2007 revoking European  
patent No. 837076 pursuant to Article 102(1)  
EPC 1973.

**Composition of the Board:**

**Chairman:** B. ter Laan  
**Members:** M. C. Gordon  
C.-P. Brandt  
D. Marquis  
C. Vallet

**Summary of Facts and Submissions**

I. The appeal lies from the decision of the opposition division announced on 25 January 2007 and posted on 21 June 2007 revoking European patent number EP-B1-0 837 076 (granted on European patent application number 97 117 337.2).

II. The patent was granted with a set of 7 claims, whereby claims 1-3 were independent claims and read as follows:

"1. A water-absorbing agent, comprising a polyacrylic salt-crosslinked polymer obtained by polymerizing a monomer comprising a major proportion of acrylic acid or a salt thereof, and the surface of said polymer is further crosslinked, having an absorption capacity of 30 (g/g) or more and an absorption efficiency of 0.70 or more under a pressure of 4.9 kPa ( $\approx 50\text{g/cm}^2$ ), wherein the absorption efficiency under said pressure is shown by the following equation:

absorption efficiency under pressure of 4.9 kPa ( $\approx 50\text{ g/cm}^2$ )

$$\begin{aligned}
& \text{absorption capacity of upper swollen gel layer of water-} \\
& \text{absorbing agent under pressure of 4.9 kPa } (\approx 50\text{ g/cm}^2) \\
= & \text{-----} \\
& \text{absorption capacity of lower swollen gel layer of water-} \\
& \text{absorbing agent under pressure of 4.9 kPa } (\approx 50\text{ g/cm}^2)
\end{aligned}$$

the measurement conditions of the absorption capacity and the absorption efficiency being described on description pages 29 to 33 as filed (corresponding to pages 11 and 12 of EP 0 837 076 A2).

2. A water-absorbing agent, comprising a polyacrylic salt-crosslinked polymer obtained by polymerizing a monomer comprising a major proportion of acrylic acid or a salt thereof, and the surface of said polymer is further crosslinked, having an absorption capacity of a lower swollen gel layer of 45 (g/g) or more and an absorption efficiency of 0.4 or more under a pressure of 4.9 kPa ( $\approx 50\text{g/cm}^2$ ), wherein the absorption efficiency under said pressure is shown by the following equation:

$$\begin{aligned} & \text{absorption efficiency under pressure of 4.9 kPa } (\approx 50 \text{ g/cm}^2) \\ & \\ & \text{absorption capacity of upper swollen gel layer of water-} \\ & \text{absorbing agent under pressure of 4.9 kPa } (\approx 50 \text{ g/cm}^2) \\ = & \text{-----} \\ & \text{absorption capacity of lower swollen gel layer of water-} \\ & \text{absorbing agent under pressure of 4.9 kPa } (\approx 50 \text{ g/cm}^2) \end{aligned}$$

the measurement conditions of the absorption capacity and the absorption efficiency being described on description pages 29 to 33 as filed (corresponding to pages 11 and 12 of EP 0 837 076 A2).

3. A water-absorbing agent, comprising a polyacrylic salt-crosslinked polymer obtained by polymerizing a monomer comprising a major proportion of acrylic acid or a salt thereof, and the surface of said polymer is further crosslinked, having an absorption capacity of a lower swollen gel layer of 30 (g/g) or more and an absorption efficiency of 0.3 or more under a pressure of 4.9 kPa ( $\approx 50\text{g/cm}^2$ ), wherein the absorption efficiency under said pressure is shown by the following equation:

absorption efficiency under pressure of 4.9 kPa ( $\approx 50 \text{ g/cm}^2$ )

absorption capacity of upper swollen gel layer of water-  
absorbing agent under pressure of 4.9 kPa ( $\approx 50 \text{ g/cm}^2$ )

= -----

absorption capacity of lower swollen gel layer of water-  
absorbing agent under pressure of 4.9 kPa ( $\approx 50 \text{ g/cm}^2$ )

and wherein the relationship between the absorption efficiency and the absorption capacity of the lower swollen gel layer under said pressure is defined by the following equation:

absorption efficiency under pressure of 4.9 kPa ( $\approx 50 \text{ g/cm}^2$ )  
 $> 1.82 - 2.93 \times 10^{-2} \times$  (absorption capacity of lower swollen gel layer  
under pressure of 4.9 kPa ( $\approx 50 \text{ g/m}^2$ ))

the measurement conditions of the absorption capacity and the absorption efficiency being described on description pages 29 to 33 as filed (corresponding to pages 11 and 12 of EP 0 837 076 A2)."

III. A notice of opposition against the patent was filed on 28 December 2004 in which revocation of the patent on the grounds of Art. 100(a) EPC (lack of novelty, lack of inventive step) was requested. Basis for these objections was an alleged public prior use which was supported *inter alia* by an experimental report - designated D3. Part of this report related to measurements of the absorption efficiency, for the purpose of which the opponent had replicated the measurement apparatus described in the section of the patent in suit referred to in the independent claims.

The patentee in its response to the opposition (letter of 10 August 2005) challenged the probative value of

the measurements reported by the opponent in D3, arguing that in the production of the polymeric water-absorbent resins even intentionally controlled properties "deflected" over a range during the production (paragraph bridging pages 6 and 7). Furthermore, it was submitted, since the properties specified in operative claim 1 were novel parameters and had not hitherto been known to the skilled person, these would "much deflect" from production lot to production lot (page 8, first complete paragraph, and in particular page 9, second full paragraph).

The opponent in its next submission, dated 6 December 2005, invoked the ground of opposition pursuant to Art. 100(b) EPC and with a letter of 18 October 2006 submitted an experimental report designated D6 in support thereof. This report contained *inter alia* measurements of the absorption efficiency which required the use of the apparatus employed in the preparation of experimental report D3, i.e. the opponent's replica of the apparatus described in the examples of the patent in suit. The findings of this report were challenged by the patentee in a letter of 18 January 2007 in which it submitted its own experimental evidence. The opponent filed supplemental data relating to the experiments reported in D6 with a letter of 23 January 2007.

IV. The decision of the opposition division was based on the claims of the patent as granted as the main request and six sets of claims forming a first to a sixth auxiliary request whereby the first to fourth auxiliary requests had been filed with the rejoinder to the notice of opposition (letter of 10 August 2005), the

fifth and sixth auxiliary requests being filed with a letter dated 24 November 2006.

- V. In its decision the opposition division held that the subject-matter of claim 1 of the main request lacked novelty in view of the public prior use (Art. 54 EPC). The subject-matter of the remaining requests was held not to meet the requirements of Art. 83 EPC.

The first auxiliary request differed from the main request in that in claim 1 the lower limit of the absorption efficiency was 0.75 instead of 0.70. The evidence of D6 and the supplemental information of 23 January 2007 - which confirmed that in D6 the temperature profile employed for the reaction and the particle size of the product of the first step were within the range given in the patent in suit (*inter alia* referential example 1) - showed that the opponent had not been able to reproduce example 1 of the patent in suit.

According to the decision this meant that the patent did not provide a clear teaching as to how the starting components or the process conditions could influence the absorption parameters as claimed. The opponent had apparently been unable to identify from the patent in suit what had to be modified in order to arrive at a resin having the absorbent parameters of referential examples 1 and 2 and example 1 of the patent in suit. Consequently claim 1 of the first auxiliary request did not meet the requirements of Art. 83 EPC.

Auxiliary requests 2-6 were held not to meet the requirements of Art. 83 EPC for other reasons which are

not relevant for the present decision.

Accordingly the patent was revoked.

VI. On 6 August 2007 the patent proprietor lodged an appeal against the decision, the prescribed fee being paid on the same date.

VII. The statement of grounds of appeal was submitted on 18 October 2007. The main request was for rejection of the opposition, i.e. maintenance of the patent as granted. Eleven sets of claims forming first to 11th auxiliary requests were submitted, which all contained a claim similar to claim 1 of the main request, albeit in some cases with a restriction of some features, in particular the absorption efficiency.

The appellant noted that the objections raised in the decision under appeal pursuant to Art. 83 EPC with respect to claims 1 to 3 of the first auxiliary request "should also apply to claims 1 to 3 as granted because [these sets of claims] correspond to each other except for the fact that in claim 1 as granted a lower absorption efficiency limit of 0.70 is claimed."

The appellant made a further written submission with a letter dated 22 December 2008.

VIII. The opponent - now the respondent - replied with a letter dated 4 April 2008, submitting a further experimental report, designated D7.

IX. On 17 January 2012 the Board issued a summons to attend oral proceedings. In a communication dated 15 February



2012 the Board set out its preliminary assessment of the case.

- X. By letter of 2 April 2012 the respondent made further submissions and submitted a further experimental report.

By a letter, also of 2 April 2012, the appellant filed seven further sets of claims forming a 12th to 18th auxiliary request all of which had a single independent claim based on claim 1 of the patent as granted. This submission was also accompanied by an experimental report.

- XI. Oral proceedings were held before the Board on 15 May 2012.

- XII. The arguments of the appellant can be summarised as follows:

- (a) The patent provided two main processes for forming the absorbent agent, whereby both relied on a step of reducing the amount of elutable components.
- (b) Paragraph [0032] to paragraph [0050] described the first method, leading to the product defined according to claim 1. This passage taught that in the preparation of the water-absorbing agent it was necessary that the starting water-absorbent resin had a content of elutable components of 1 part by weight or less per 100 parts by weight of the water-absorbent resin and an absorption capacity with a physiological saline solution of 40 (g/g) or more. This was the product produced according to referential examples 1 and 2. As this

product was known and available commercially, its preparation was not part of the invention. Furthermore, it was not necessary to replicate referential examples 1 and 2 in every detail, as long as the requirements of absorption capacity and eluting component of the resin were satisfied. The invention to which in particular claim 1 of the patent in suit was directed, related to the step of surface crosslinking this starting material, which crosslinking was set out in example 1.

- (c) The only conclusion that could be drawn from the failure of the respondent as reported in D6 and D7 to obtain either the product having the properties reported in referential examples 1 and 2 or subsequently in example 1, was that the respondent had deliberately carried out the reaction in such a manner as to ensure failure. This position was supported by the fact that the appellant, as demonstrated in the experimental report submitted with the letter of 2 April 2012, had experienced no difficulties in replicating the teachings of the patent in suit.

With respect to the respondent's experimental report D6 it seemed that the temperature requirements of referential example 1, i.e. attaining a maximum temperature of 80°C in the polymerisation had not been complied with. Although this temperature requirement had seemingly been complied with in D7, the fact that according to this report, too, the results of the patent could seemingly not be reproduced confirmed

that some aspect(s) of this repetition had also been incorrect.

- (d) The examples of the patent in suit as well as the further evidence provided by the appellant showed that the skilled person could carry out the invention so that the requirements of Art. 83 EPC were complied with.
  
- (e) It was in any case not the burden of the appellant to seek or provide explanations for the failure of the respondent to replicate the teachings of the patent. On the contrary, the case law of the Boards was clear that when an opponent arrived at a different result to that reported in the patent in suit or confirmed by tests of the patent proprietor, it was the burden of the opponent to support and justify its findings. In such a case the patent proprietor had the benefit of the doubt.

Regardless of this case law, it was not necessary for the examples of the patent to provide every single minute detail of the process since the skilled person could easily and obviously fill in any (insignificant) gaps in the disclosure of the examples from his knowledge.

XIII. The arguments of the respondent can be summarised as follows:

- (a) According to the description of the patent in suit, paragraph [0032] and following and the submissions of the appellant, it was necessary as well as sufficient that the starting resin met two criteria, namely a content of elutable material of

1 part by weight or less per 100 parts by weight of the resin and an absorption capacity of 40 (g/g) or more with a physiological saline solution. Both the repetitions carried out by the respondent, i.e. D6 and D7 had resulted in starting resins which met these requirements although in neither case had the values reported in referential examples 1 and 2 been obtained.

However on carrying out the surface crosslinking according to the teaching of example 1 of the patent in suit of a starting material which satisfied the prerequisites set out in the patent specification, the resulting product not only did not have the properties as reported in example 1 of the patent in suit, but furthermore did not meet the requirements of the absorption efficiency according to claim 1 (at least 0.70).

- (b) The appellant had failed to indicate any deficiencies in the procedure adopted by the respondent, at least as far as experimental report D7 was concerned, beyond noting that incorrect results had been obtained.

The experimental report of the appellant of 2 April 2012 amounted to little more than a "cut and paste" of the text of the examples of the patent with no further information and hence did not assist in clarifying what might have had to be done differently compared to D6 and D7.

XIV. The appellant (patent proprietor) requested that the decision under appeal be set aside and the patent be

maintained in the form as granted, or, alternatively maintenance of the patent in amended form on the basis of one of the auxiliary requests 1 to 11 filed with the statement of grounds of appeal, or on the basis of auxiliary requests 12 to 18 filed with letter dated 2 April 2012.

XV. The respondent (opponent) requested that the appeal be dismissed.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Main request - Art. 83 EPC*

2.1 In the present case the main request - the claims of the patent as granted - was revoked on the grounds of Art. 100(a) EPC in combination with Art. 54 EPC. The first auxiliary request was revoked on the grounds of Art. 100(b) EPC.

Since the first auxiliary request relied on the same properties - in more restricted scope - as the main request, the reasoning of the opposition division leading to the finding of insufficiency with respect to the first auxiliary request - which was based on the failure of the opponent to replicate the examples of the patent in suit - applies equally to the subject matter of the main request. This was explicitly acknowledged by the appellant in the statement of grounds of appeal (page 5, first paragraph). Also during the further appeal proceedings, the appellant

never indicated that they did not agree with the introduction of an objection of insufficiency regarding the main request, but rather defended their case, giving full arguments. Therefore, the objection under Article 83 EPC in respect of the main request is admissible.

2.2 According to paragraph [0011] of the patent in suit an object of the invention is to provide a water-absorbing agent which can display high absorption capacity under pressure and sufficient absorbency.

2.2.1 According to paragraphs [0019] and [0020] the claimed water-absorbing agent is obtained by a process in which a water-absorbent resin having an absorption capacity of a specific value or more and has the amount of eluting component oozing out of the surface of an unsaturated swollen gel reduced to a specific value or less is first obtained and the surface of the resin is then crosslinked.

According to paragraph [0023] it is required that the starting water-absorbing resin has an absorption capacity of 40 (g/g) with physiological saline solution and a content of eluting component of 1 part by weight or less per 100 parts by weight of the resin.

According to paragraphs [0024] to [0027] the water-absorbent resin is a hydrophilic polymer having a crosslinked structure, whereby *inter alia* polyethyleneglycol diacrylate can be used as an internal crosslinking agent.

Starting at paragraph [0032] it is again emphasised that it is necessary to reduce the level of eluting

component to below 1 part by weight per 100 parts of resin and to have an absorption capacity of 40 (g/g) or more. Two methods are taught for accomplishing this, namely either repeated washing with treating solutions or by polymerising the resin in the presence of a water soluble chain transfer agent and then treating it with a hydrophilic solution (paragraph [0033]).

In paragraph [0041] an alternative method for reducing the amount of eluting component is mentioned: to heat the resin in the presence of a surface crosslinking agent. This alternative is not exemplified in the patent, as confirmed by the appellant at the oral proceedings.

According to paragraph [0050], in addition to the aforementioned process comprising the steps of obtaining a first resin having an absorption capacity of a specific value of more and of which the content of eluting component is reduced to a specific value or less followed by crosslinking the surface of the resin, the water absorbing agent can be prepared by a further process involving crosslinking the neighbourhood of the surface of the particle - of specified particle size - to provide a crosslinking density gradient. According to paragraph [0051] this second method is carried out by employing two crosslinking agents of differing solubility parameters and ensuring that the particle size of the starting material is in a particular range.

2.2.2 The first of these processes, i.e. that described starting at paragraph [0032] and indicated as method (1) in paragraph [0033], was submitted by the appellant to

give rise to the product of claim 1 and is exemplified in the first group of examples, i.e.

- referential example 1 (preparation of the starting hydrophilic resin);
- referential example 2 (washing to remove the eluting component);
- example 1 (surface crosslinking to yield the water-absorbing agent).

2.2.3 The submissions of the appellant, consistent with the above discussed teaching of the patent in suit, are that the indicated absorption capacity (40 (g/g) or more) and elutables content (below 1 part by weight per 100 parts of resin) of the starting water-absorbing resin are not only necessary but are also sufficient prerequisites in order to obtain the product of claim 1 upon the surface crosslinking step.

2.2.4 According to referential example 2 of the patent in suit the minimum requirements are exceeded, i.e. the absorbing capacity is 57 (g/g) and the content of eluting component is 0.5 wt%. The resulting surface crosslinked absorbing agent - prepared in example 1 - has properties which are above the minima specified in claim 1, in particular an absorption efficiency under pressure of 0.77.

2.2.5 The respondent in its repetitions of the referential examples 1 and 2 as reported in D6 and D7 in both cases obtained resins which, whilst they did not exhibit the properties reported in the examples of the patent in suit, nevertheless satisfied the indicated criteria regarding minimum absorption capacity and maximum content of elutables:



*Referential Example 1*

	<b>Absorption capacity g/g</b>	<b>Eluting component Gew.-%</b>
Patentschrift	58	5,5
D6 T <sub>max</sub> = 67 °C	43	5,5
D7 T <sub>max</sub> = 80 °C	48,5	4,8

Following the second step, i.e. the removal of the eluting compound (referential example 2) the following properties were obtained:

*Referential Example 2*

	<b>Absorption capacity g/g</b>	<b>Eluting component Gew.-%</b>
Patentschrift	57	0,5
D6 T <sub>max</sub> = 67 °C	44,4	0,5
D7 T <sub>max</sub> = 80 °C	52,4/52,2	0,7/1,1

However upon submitting these products to surface crosslinking according to the protocol of example 1 of the patent in suit not only were products obtained which did not have properties corresponding to those of example 1 of the patent, the property "absorption efficiency" was in all cases below the minimum required by claim 1 (0.70):

*Beispiel 1*

	<b>Absorption capacity g/g</b>	<b>Eluting component Gew.-%</b>	<b>ACuP g/g</b>	<b>Efficiency</b>
Patentschrift	28,4	0,5	34,6	0,77
D6 T <sub>max</sub> = 67 °C t = 20 min	37,5	0,5	25,9	0,38
T <sub>max</sub> 67°C t = 30 min	36,0	0,4	33,5	0,63
D7 T <sub>max</sub> = 80 °C t = 20 min	43,1	0,5	30,6	0,46
T <sub>max</sub> = 80 °C t = 30 min	42,0	0,9	31,3	0,48

2.2.6 The respondent provided highly detailed accounts of the experimental protocols employed in preparing the

experimental reports D6 and in particular D7 in which a higher temperature for the initial polymerisation had been employed as a reaction to the criticism regarding D6 by the appellant. Furthermore the respondent went to great lengths to attempt to replicate the teaching of the patent in suit, even to the extent of constructing the "custom" apparatus for determination of absorption efficiency described in the patent in suit. Further, variations in conditions, deviating from those employed in the examples of the patent in suit were investigated, e.g. increasing the treatment time, as is shown in the tables above.

- 2.2.7 The appellant has not provided any analysis of the copious and detailed evidence advanced by the respondent.

As far as D7 is concerned, the appellant failed to highlight a single discrepancy or divergence between the experimental methods adopted by the respondent and those set out in the examples in the patent in suit. On the contrary, the sole argument advanced by the appellant with respect to the diverging results obtained by the respondent was that the respondent had - in some unidentified manner - deliberately carried out the methods in a manner to ensure failure.

Regarding the aspect of certain details lacking from the examples of the patent in suit, in respect of which the respondent had to make certain assumptions, the appellant did not indicate any likely significance or impact of any of these on the outcome of the processes. On the contrary, it was simply argued that any such gaps in the teaching of the patent in suit could either

easily be filled in by common general knowledge or were not of material importance.

2.2.8 In the examples of the patent in suit the starting materials had a much higher absorption capacity than the materials obtained by the respondent. The appellant provided no further experiments to show how to obtain such values, but instead stated that the starting materials were commercially available and were not part of the invention. However, the appellant also failed to show how to obtain the claimed adsorption efficiency values starting from materials with lower adsorption capacities but still within the range indicated in the patent and confirmed by the appellant as both being necessary and sufficient.

2.2.9 The situation in the present case thus emerges as the following:

- The patent identifies certain boundary conditions which the starting material - to be subjected to surface crosslinking - has to fulfil
- The appellant confirmed that as long as these boundary conditions were satisfied the result of the patent can be obtained, i.e. these were not only necessary but also sufficient to realise the indicated results
- The appellant stated that the manner of producing the starting material was of no significance as long as the indicated boundary conditions were satisfied
- The repetitions provided by the respondent fulfilled the indicated boundary conditions for the starting material
- Despite this upon performing surface crosslinking according to the protocol of example 1 of the patent

not only could the results of this example not be replicated, the resulting product did not have a value of absorption efficiency falling within the scope of claim 1

- No deficiencies or defects in the experimental protocols of the respondent were identified by the appellant.

2.2.10 Under these circumstances and in the light of the available evidence the Board concludes that, whilst the conditions identified in the patent which the starting material subjected to surface crosslinking has to fulfil regarding absorption capacity and content of elutables may indeed be necessary - which has not been proven - they are in any case not sufficient to obtain the result of the patent in suit. Apparently other factors play a decisive role. These other factors are however not identified in the patent in suit. Thus there is information lacking from the disclosure, the consequence of which is that the skilled person is prevented from reproducing the subject-matter of the patent. The main request therefore does not meet the requirements of Art. 83 EPC.

2.3 The appellant stated that the burden of proof in opposition proceedings lay with the respondent, being the opponent, and that the benefit of the doubt should be given to the appellant, as the patent proprietor. However, apart from the question whether that would apply also in cases where the patent is revoked by the opposition division and the patent proprietor files an appeal against that decision and hence has to prove that the appealed decision was wrong, in the present

case there are other reasons why the appellant's argument cannot be followed.

The claimed subject-matter is characterized by a parameter, the absorption efficiency, that had undisputedly never been used before and cannot be regarded as a parameter usual in the art. It is an entirely new parameter. In addition, that parameter cannot be measured using a simple or readily available, or conventionally used apparatus, but instead requires a specially made device in order to be measured; a device that is not commercially available, has no standard handbook, and was specially developed by the appellant in relation to the new parameter. As shown by the extensive reports by the respondent, it was not easy to replicate it on the basis of the information provided by the patent in suit as a number of details had to be inferred. In those circumstances a heavy burden lies on the patent proprietor to provide the skilled person with all the details necessary to obtain and measure the new parameter and it is not sufficient for the appellant/patent proprietor simply to say that the required values were not obtained due to a deliberate action by the respondent/opponent, without even giving a hint of where the respondent/opponent has gone wrong. By showing that starting with the materials indicated as necessary and sufficient for the claimed water-absorbing agent to be prepared and nevertheless upon following the teaching of the patent not obtaining the claimed product, the respondent has made more than plausible, in fact has shown, that the information in the patent in suit is insufficient. Against that there is no explanation at all by the appellant. In this case,

there is no justification for giving any benefit of the doubt to the patent proprietor.

2.4 For the above reasons the main request is refused.

3. *Auxiliary requests - Article 83 EPC*

Since all the auxiliary requests have a claim corresponding to claim 1 of the main request, albeit in some cases with some restriction of features, in particular absorption efficiency, the conclusion for the main request applies *mutatis mutandis* to all the auxiliary requests.

Accordingly auxiliary requests 1-18 likewise do not meet the requirements of Art. 83 EPC and have to be refused.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar

The Chairman

M. Canueto

B. ter Laan