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**Datasheet for the decision
of 23 October 2023**

Case Number: T 0481/21 - 3.3.06

Application Number: 15717527.4

Publication Number: 3126570

IPC: D21H11/18, D21B1/34

Language of the proceedings: EN

Title of invention:

METHOD FOR PRODUCING NANOFIBRILLAR CELLULOSE AND NANOFIBRILLAR
CELLULOSE PRODUCT

Patent Proprietor:

UPM-Kymmene Corporation

Opponent:

Stora Enso Oyj

Headword:

Kymmene/Nanofibrillar cellulose

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 12(4), 12(2), 12(6), 13(2)

Keyword:

Inventive step - (no) - obvious alternative

Amendment to case - requirements of Art. 12(2) RPBA 2020 met
(yes)

Late-filed request - circumstances of appeal case justify
admittance (no)

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
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Case Number: T 0481/21 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 23 October 2023

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
22 February 2021 concerning maintenance of the
European Patent No. 3126570 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: S. Arrojo
R. Cramer

Summary of Facts and Submissions

- I. An appeal was filed by the opponent contesting the decision of the opposition division to maintain European Patent No. 3 126 570 in amended form on the basis of the main request filed on 27 November 2020.
- II. In the statement of grounds of appeal, the appellant argued that the invention in claims 1 and 9 was insufficiently disclosed, not novel in view of **D1** (WO 2013/076376 A1) or **D3** (WO 2012/168562 A1), and not inventive in view of D1 alone or combined with D3 or **D5** (WO 2013/072559 A1), or in view of D5 alone or combined with D1 or D3.
- III. In the reply filed on 5 November 2021, the patent proprietor and respondent requested that the appeal be dismissed, or as an auxiliary measure, that the patent be maintained on the basis of the claims according to one of auxiliary requests 1 to 17 filed therewith. It also requested that the inventive step objection starting from D1 not be admitted.
- IV. In its preliminary opinion, the Board concluded inter alia that the main and second auxiliary requests did not meet the requirement of sufficiency of disclosure and that none of the requests on file appeared to meet the requirements of Article 56 EPC when starting from D1 as closest prior art.
- V. In a submission dated 22 September 2023, the proprietor withdrew the main and second auxiliary requests.
- VI. Independent product claim on which the present decision is based, namely claim 9 of auxiliary requests 3, 9,

11, and claim 8 of auxiliary requests 5, 7, 14, 16 and 17, reads as follows:

"A nanofibrillar cellulose product, which is in the form of moist powder containing particles formed of cellulose nanofibrils, where the cellulose is chemically modified cellulose and the median particle diameter by laser diffraction analysis is 100 - 1000 micrometers, preferably 150 - 500 micrometers, and which, when dispersed to a concentration of 0.5% in water, has a zero shear viscosity of 1,000 to 50,000 Pa·s and a yield stress of 1 to 50 Pa, advantageously 3 to 20 Pa, and wherein the cellulose is ionically charged and is

- oxidized cellulose having carboxylate content of at least 0.95 mmol/g or higher, preferably 0.95 - 1.65 mmol/g,*
- carboxymethylated cellulose having degree of substitution above 0.1, or*
- cationized cellulose having degree of substitution of at least 0.1 or higher."*

The independent product claim in auxiliary requests 4, 6, 8, 10, 12, 13 and 15 corresponds to the above subject-matter with the following amendment (highlighted by the Board): *"- oxidized cellulose having carboxylate content of at least ~~0.95~~ 0.8 mmol/g or higher, ~~preferably 0.95 - 1.65 mmol/g, ..."~~*

VII. At the oral proceedings, which took place on 23 October 2023, the proprietor substituted auxiliary request 1 with a new version (which was not admitted into the proceedings by the board). The present decision is therefore based on the following parties' requests:

The appellant requests that the decision under appeal be set aside and the patent be revoked in its entirety.

The respondent requests that the patent be maintained on the basis of the claims according to auxiliary request 1 as filed during the oral proceedings before the Board or, as an auxiliary measure, on the basis of the claims of one of the auxiliary requests 3 to 17 filed with the reply to the appeal on 5 November 2021.

Reasons for the Decision

1. Admittance of the inventive step objection starting from D1
 - 1.1 In the grounds of appeal, the appellant formulated an objection against the then pending main request starting from document D1 as the closest prior art. The proprietor argued that this objection should not be admitted because the only document cited as closest prior art in the appealed decision was D5, so this objection was not part of the appealed decision under Article 12(2) RPBA.
 - 1.2 The Board however notes that document D1 was extensively discussed both under novelty and under inventive step in the first instance proceedings. First, D1 was cited in the notice of opposition (as E1) not only to attack novelty of the product and the process claims, but also as closest prior art to raise an inventive step objection against the subject-matter of claim 4 as granted, which was subsequently combined with claim 1. The proprietor also formulated his inventive step argumentation starting from D1 as the closest prior art for the method and the independent

product claims (see pages 8 to 11 of the submission dated 27 November 2020).

- 1.3 It is apparent from the contested decision and the minutes that at the oral hearing document D1 was discussed in order to assess the novelty of the method and the product claims. As also explained in the minutes, D5 was however considered as representing the closest prior art because it addressed the same technical problem and had certain features in common with the invention.

- 1.4 Since there is no indication that the inventive step objections starting from D1 discussed during the written proceedings were explicitly or implicitly abandoned at the oral hearing, they are effectively part of the first instance proceedings, implying that the appealed decision was at least implicitly based on them as required by Article 12(2) RPBA. In particular, the Board considers that the decision to contemplate D5 as the closest prior art implicitly involves the selection of D5 over D1 as closest prior art, which does not imply that the objections starting from D1 were no longer maintained, but simply that it was decided (in view of the conclusions on novelty in view of D1) that D5 represented a more promising springboard. Since the inventive step objection is considered to be part of the first instance proceedings, there is no basis not to admit this objection under Article 12(4) and (6) RPBA.

- 1.5 Moreover, the Board also notes that even if the objection was considered to be new, the criteria set out in Article 12(4) RPBA would have to be applied. In this respect, the Board reiterates the conclusions presented in the preliminary opinion, namely that the

inventive step argument starting from D1 i) is not complex (D1 is similar to D5 and its content was extensively addressed during first instance proceedings), ii) is *prima facie* relevant (i.e. it addresses the issues which led to the contested decision) and iii) is unlikely to have a significant impact on procedural economy.

1.6 The Board also notes that at the oral proceedings the patent proprietor no longer objected to discussing the inventive step of the product claim starting from D1 as the closest prior art.

1.7 The Board therefore admitted into the proceedings the inventive step objection starting from D1 as the closest prior art.

2. New auxiliary request 1 - Admittance

2.1 At the oral proceedings before the Board, the proprietor filed a new auxiliary request in response to the opinion that the product claim 9 according to auxiliary request 1 filed with the reply to the appeal was not considered to be inventive in view of D1.

2.2 The proprietor argued that the new request should be admitted, because the inventive step objections against claim 9 were new, as they did not rely on the original objections of the appellant or on the content of the preliminary opinion, but on further considerations based on the alleged similarities between the solid content of the product in D1 and that associated with the moist powder according to claim 9.

2.3 The Board however notes that, contrary to the proprietor's conclusions, the inventive step objections

raised at the oral proceedings correspond to those presented in point 7 of the preliminary opinion. That opinion clearly explained that the key issue was that the term "moist powder" in claim 9 was not considered to be meaningfully different from the semi-dry nanofibrils disclosed in D1. More specifically, in paragraphs 7.2 and 7.3 of the opinion, the Board concluded that the process of D1 would necessarily result in something falling within the concept of "moist powder" if the nanofibrils were dried to a certain degree. The reference to the first paragraph of page 4 of D1 merely provided further support for this argument, since this passage indicates that the refined and possibly dried cellulose may have a solid content which the patent associates with the term "moist powder". The arguments presented at the oral hearing are therefore not new, but merely a further development of the objection raised in the preliminary opinion of the Board. There are therefore no exceptional circumstances which could justify the filing of a new request at such a late stage.

- 2.4 In view of the above, the Board exercised its discretion under Article 13(2) RPBA not to admit the new auxiliary request 1 in the appeal proceedings.

- 3. Auxiliary requests 3 to 17 - Inventive Step
 - 3.1 The Board has concluded that the subject-matter of the independent product claim does not involve an inventive step under Article 56 EPC.

 - 3.2 It should be noted that this issue was discussed at the oral proceedings before the Board in relation to claim 9 of auxiliary request 1 filed with the reply to the appeal. While this request was withdrawn and replaced

by a new auxiliary request 1 which was not admitted (see point 2. above), the same objection applies to the independent product claim (i.e. either claim 8 or 9) of each of auxiliary requests 3 to 17, because in each of these requests the product claim has the same differentiating features with respect to D1, which anticipates the alternative of chemical modification of the cellulose by carboxymethylation. The only change in the subject matter of the independent product claim in some of the requests concerns the other alternative defining the chemical modification of the cellulose by carboxylation.

3.3 According to the patent (paras. [0006] and [0007]), the invention overcomes the difficulties of efficiently disintegrating nanofibrillar cellulose at higher consistencies. In particular, it was found that cellulose can be disintegrated at higher consistencies to produce nanofibrillar cellulose with a high zero shear viscosity by treating the cellulose in a machine with counterrotating rotors and using cellulose with a high degree of chemical modification (see par. [0009]). Concerning the product, the patent indicates (par. [0029]) that the nanofibrillar cellulose obtained with the above method has a physically recognisable characteristic morphology designated as "moist powder form". This is said to be the result of the "moisture-dependent stickiness of the particles", which leads to the agglomeration of the nanofibrillar cellulose to form small moist cellulose particles.

3.4 The Board first notes that the concept of "moist powder" does not have a commonly accepted meaning in the field. However, since this term was part of the claims as granted, it cannot be examined under Article 84 EPC and must be interpreted either in view of the

wording of the claim or with the support of the description. Even though, as indicated at the oral proceedings, the Board would be inclined to interpret the claim in view of its wording alone (i.e. following the broadest possible interpretation of the feature "moist powder"), it will be assumed for the sake of the argument (in the proprietor's favour) that the term should be interpreted with the support of the explanations in the description.

3.5 The feature "moist powder" in the product claim is thus interpreted in the light of paras. [0028], [0029] and [0063] as an agglomeration of nanofibrils and water taking the form of particles with the sizes defined in the claim and with a solid content in the order of 16 to 60%.

3.6 Closest prior art

3.6.1 Document D1 discloses a method for producing nanofibrillated cellulose, wherein the cellulose is carboxymethylated with a degree of substitution between 0.15 and 0.25 (see page 2, lines 20-24). The consistency of the cellulose at the refining stage is preferably 2 to 15%, for example between 2 and 4% or between 10 and 20% (see page 16, lines 24-26). The obtained cellulose has a zero shear viscosity of 50000 to 100000 Pa·s and a yield stress of 10 to 40 Pa measured at a 0.5% concentration in water (see page 18, lines 19-25). More specifically, example 6 and figure 5 show that the zero shear viscosity and the yield at 0.5% of a carboxymethylated nanofibrillar cellulose having a degree of substitution of 0.22 fall within the claimed ranges. Document D1 also indicates (see page 4, lines 1-9) that the final cellulose product, which may be exposed to a drying process, should have a dry

content of at least 20% and up to 70% to facilitate storage and/or transportation.

3.6.2 The proprietor argued that the examples in D1 were carried out at low consistencies, so the resulting products could not be regarded as being in moist powder form in the sense of the patent. The only products with high consistencies (i.e. of the order of those associated with a moist powder form) resulted, as indicated in the first paragraph of page 4, from subjecting the refined cellulose to a drying step, which would inevitably lead to an agglomeration of the fibres by hornification and a corresponding deterioration in the rheological properties of the nanofibrillar cellulose product upon redispersion. In contrast, the moist powder produced by the process according to the contested patent ensured that the fibres retained their high aspect ratio despite a high solid content. It was the high aspect ratio that resulted in the characteristic morphology of the wet powder and also the retention of the advantageous rheological properties on redispersion as defined in the product claim. The high consistency product in D1 therefore did not anticipate either the morphology of the moist powder or the rheological properties on redispersion.

3.6.3 The Board disagrees with the proprietor, because there is no basis to conclude that the process in D1 would lead to a product significantly different from that obtained with the method according to the invention. Document D1 discloses the refining of chemically modified cellulose having both a consistency and a degree of chemical modification falling within the scope of the invention, and teaches that (see page 4, lines 5-7) thanks to the anionisation step (i.e.

chemical modification) of the cellulose, the partly dried fibril cellulose can be more easily redispersed.

More specifically, D1 discloses (see page 16, lines 24-26) that the refining process may preferably be carried out with a chemically modified cellulose having a consistency of 10-20% and that the final product may have a dry matter content of at least 20% (see page 4 lines 1-9), a disclosure which encompasses embodiments in which the solid content of the final product is equal or at least very similar to that of the mixture exposed to the disintegration treatment. Consequently, the final product can be obtained with a mild drying step or with no drying step at all. Moreover, as pointed out at the oral proceedings, the phenomenon of hornification is known to take place only when the water content is significantly reduced, so even if a drying step was required, it would be unlikely to lead to a significant hornification of the fibres at least in those embodiments having lower consistencies (e.g. around 20%) and higher water content.

There is thus no reason to conclude that the rheological properties upon redispersion of at least some of the embodiments of the final product in D1 would differ significantly from those described in the examples of this document, which is also consistent with the above cited teaching that this final product can be easily redispersed.

The Board therefore concludes that D1 anticipates a product having a high consistency (corresponding to that associated with the moist powder) while also maintaining rheological properties falling within the product claim.

3.6.4 On the other hand, D1 does not anticipate that the high consistency product agglomerates to form particles with a diameter falling within the range defined in the product claim.

The product claim thus differs from D1 in the specific morphology of the particles, in particular in that the fibres are aggregated to form particles having a median diameter of 100 to 1000 microns.

3.7 Problem solved by the invention

3.7.1 The main line of argumentation presented by the proprietor is based on the assumption that the product according to the invention would provide the advantage of obtaining a high solid content product with good rheological properties upon redispersion. The proprietor also argued that the moist powder form ensured a product which was flowable and could be easily transported (i.e. due to the low water content).

3.7.2 Since, as indicated above, the product of D1 is considered to have consistencies and rheological properties falling within the claimed ranges, there is no reason to conclude that the product according to the invention would provide the alleged advantages with respect to the relevant embodiments in D1. The only difference of the invention with respect to such embodiments is the formation of fibre aggregations having a diameter of 100 to 1000 microns.

3.7.3 The Board sees however no evidence or argument indicating that the formation of these particles would achieve any specific technical effect. The problem solved by the invention must therefore be reformulated

less ambitiously, namely as the provision of an alternative nanofibrillar cellulose product.

3.8 Obviousness of the solution

- 3.8.1 According to the patent (see par. [0029]), the fibre particles aggregate due to their moisture-dependent stickiness. At the oral proceedings, the proprietor further explained that this stickiness was caused by the hydroxyl terminal groups in the fibres, and that the aggregation was promoted by maintaining the high aspect ratio of the fibres at high consistencies. As argued in point 3.6.3 above, D1 encompasses embodiments in which hornification plays no major role, so the fibres are expected to maintain their original high aspect ratio and therefore also their moisture dependent stickiness. Under such circumstances and, as pointed out in the preliminary opinion, the formation of at least some particles as defined in the product claim would occur when the initial consistency is high enough and/or in the course of the drying stage at least under certain operating conditions encompassed by D1.

Although it cannot be concluded that the particles would necessarily be obtained under all operating conditions in D1, since the only problem solved by the invention is to provide an alternative product, the Board concludes that the skilled person would arrive at the invention by simply reproducing some of the embodiments or alternatives encompassed by the teachings of D1. The product claim therefore fails to meet the requirements of Article 56 EPC.

3.9 Since the product claim is not considered to be inventive in view of D1, none of auxiliary requests 3 to 17 meets the requirements of Article 56 EPC.

4. As none of the claim requests presented by the proprietor is considered to be both admissible and allowable, the patent should be revoked.

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:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated