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File Number: T 581/89 - 3.3.2
Application No.: 81 201 026.2
Publication No.: 0 049 012
Title of invention: Treatment of pseudoplastic polysaccharide solutions

Classification: C12P 19/04

D E C I S I O N
of 22 January 1991

Proprietor of the patent: Shell Internationale Research Maatschappij N.V.

Opponent: 01) Rhône-Poulenc Chimie de Base
02) Merck & Co. Inc.
03) Pfizer Inc.

Headword: Polysaccharide solutions/SHELL

EPC Articles 56, 87(1) and 88(4)

Keyword: "Right to priority for the same invention - (yes)"
"Inventive step - (no), obvious transposition of an ultrafiltration process"

Headnote



Case Number : T 581/89 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 22 January 1991

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Decision under appeal :

Decision of the Opposition Division of the
European Patent Office dated 12 April 1989,
posted on 13 July 1989, revoking European patent
No. 0 049 012 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : P. Lançon
Members : U. Kinkeldey
C. Holtz

Summary of Facts and Submissions

I. European patent application No. 81 201 026.2, filed on 14 September 1981 and claiming priority of 29 September 1980, was granted as European patent No. 0 049 012 with eight claims, Claim 1 reading as follows:

"1. Process for the concentration of an aqueous solution of water-soluble pseudoplastic polysaccharide having a viscosity of at least 1900 mPa.s (determined at 25°C), which comprises ultrafiltration of such a solution by contacting the solution with a porous membrane having a molecular weight cut-off of at most 65,000, at a pumping rate of at least 0.28 m/s and at a pressure differential over said membrane of 2-20 bar (g), and withdrawing liquid which has permeated through the membrane."

II. Notices of Opposition against the European patent were filed by three parties. Revocation of the patent was requested on the grounds of Article 100(a) and (b) EPC. During the proceedings before the Opposition Division, more than twenty documents were discussed out of which the following remained relevant in the appeal proceedings:

(4) Beaton, N.C. "The Application of Ultrafiltration to Fermentation Products", A.R. Cooper ed., pages 373-403; Plenum Publishing Corp. (1980)

(13) EP-A-0 069 523

(15) US-A-3 966 618

(16) FR-A-2 196 343 (= document (5) US-A-3 856 569)

(19) FR-A-2 145 953.

III. The Opposition Division revoked the patent in a decision of 13 July 1989. The ground was lack of an inventive step under Article 56 EPC of the subject-matter of Claim 1 in view of document (16).

Its decision held that the priority date of 29 September 1980 of the patent in suit was not valid. Thus, document (13), which claimed priority of 1 July 1981, was part of the state of the art under Article 54(3) EPC.

Since, however, it was not made absolutely clear whether the values of the viscosity given in document (13) were measured by the same way as those given in the patent in suit, there was no unambiguous comparability of these values. Thus, novelty was acknowledged.

There was, however, no inventive step in the light of document (16) which disclosed a method of purifying and concentrating aqueous solutions derived from marine algae by subjecting these solutions to ultrafiltration. The concentrated polysaccharides were pseudoplastic. The man skilled in the art knew that ultrafiltration was suitable for concentrating pseudoplastic solutions.

The particular technical features of the pumping rate and the initial viscosity of at least 1900 mPa.s were considered as conventional operational parameters in the practice of ultrafiltration to which the skilled person would arrive by routine test procedures in order to obtain

the desired pressure differential and an appropriate or reasonable flow.

Table XII of document (16) referred to a process of concentrating a pseudoplastic solution from an initial viscosity of 55 cp to final viscosity of 3500 cp. During the procedure that solution passed inevitably beyond the claimed value of 1900 cp. The relationship between the measures taken and the result obtained was foreseeable to the skilled person.

The subsidiary requests of the patentee to introduce the subject-matter of Claim 6 into Claim 1 did not overcome the objection to lack of inventive step.

- IV. The Appellants filed a Notice of Appeal against this decision and submitted a Statement of Grounds, together with two new sets of claims. Claims 1, 5 and 6 of the main request read as follows (amendments by addition of new features in Claim 1 compared to the granted claim emphasised by the Board):

"1. Process for the concentration of an aqueous solution of water-soluble pseudoplastic polysaccharide being a broth resulting from fermentation of a pseudoplastic polysaccharide-producing microorganism, having an initial viscosity of at least 1900 mPa.s (determined at 25°C at a shear rate of 6.28 sec⁻¹), which comprises ultrafiltration of such a solution by contacting the solution with a porous membrane having a molecular weight cut-off at most 65,000, at a pumping rate of at least 0.28 m/s and at a pressure differential over said membrane of 2-20 bar (g), and withdrawing liquid which has permeated through the membrane.

5. Process as claimed in any one of Claims 1 to 4, wherein the ultrafiltration is continued until the retentate has a viscosity exceeding 7,000 mPa.s (determined at 25°C at a shear rate of 6.28 sec⁻¹).
6. Process as claimed in any preceding claim, wherein a cell-lytic enzyme is added to the fermentation broth before ultrafiltration."

Oral proceedings were held on 22 January 1991. Respondents (02) were summoned properly but did not attend.

The Appellants argued essentially as follows:

With regard to the priority question, it was submitted that explicit recitation of all the features of a claim in a priority document was not essential for a valid claim to priority.

None of the cited prior art documents disclosed a method as claimed and, therefore, the main claim was also novel with regard to Article 54 EPC.

The features by which the process of Claim 1 differed from the process disclosed in document (16) could not be considered independently, but rather formed part of a combination of a number of parameters associated with an unexpected operative process, the operative process being inventive.

As to the restricted claims according to the auxiliary requests, it was argued that the addition of a cell-lytic enzyme to the fermentation broth improved the effect of the filtration in an unexpected way.

Incorporation of the feature that the retentate has a viscosity exceeding 7000 mPa.s rendered in any case the claim inventive; a view which could be derived from a parallel case, still pending before the Opposition Division, where document (13) is the patent in suit and the present patent constitutes a prior art document. Document (13) was maintained by the Opposition Division with a claim which was restricted by incorporating the feature that the retentate has a final viscosity of a certain value.

V. Respondents (02) were summoned properly but did not attend the oral proceedings.

VI. The Respondents submitted substantially the following arguments:

(a) With regard to the priority question, it was undisputed that the particular features newly mentioned in the claim of the patent in suit were not disclosed *expressis verbis* in the priority document. The Respondents relied on the Guidelines for Examination in the European Patent Office, Part C-V, 2.3, where it was *inter alia* stated that a claim to a detailed embodiment of a certain feature would not be entitled to priority on the basis of a mere general reference to that feature in a priority document and Chapter C-V, 2.4 said that the basic test to determine whether a claim was entitled to the date of the priority document was the same as the test of whether an amendment to an application satisfied the requirements of Article 123(2) EPC.

(b) Since priority could not validly be claimed, novelty, with regard to document (13), was at issue. It was only accepted that a claim of the patent in suit was

novel over document (13) by incorporating the feature that a cell-lytic enzyme had to be added to the fermentation broth before the ultrafiltration.

- (c) As far as inventive step was concerned, as required by Article 56 EPC, it was stated that a skilled person would have thought that ultrafiltration would be suitable for filtering microbially produced polysaccharides.

The limitations of the process as now submitted in all requests by the Appellants did not alter the outcome of the examination of this question, compared to the impugned decision.

VII. The Appellants requested that the decision under appeal be set aside and that the patent be maintained, on the basis of

- (a) The set of claims in Appendix I to a letter submitted by telefax on 9 November 1989, for all countries designated in the original application (main request) (see paragraph IV above);
- (b) the set of claims in Appendix I, but with Claim 5 incorporated into Claim 1, for all countries (auxiliary request No. 1);
- (c) the set of claims in Appendix II, submitted by telefax on 9 November 1989, for the five countries mentioned therein, and the set of claims in Appendix I for the remaining countries (auxiliary request No. 2); or
- (d) the set of claims in Appendix II, for the five countries mentioned therein, and the set of claims in

Appendix I, but with Claim 5 incorporated into Claim 1, for the remaining countries (auxiliary request No. 3).

The Respondents requested that the appeal be dismissed.

At the conclusion of the oral hearing the Board's decision was announced in accordance with the order set out below.

Reasons for the Decision

1. The appeal is admissible.
2. Amendments (Article 123(2) and (3) EPC)
 - 2.1 The main claims of the various requests are differently worded from the main claim of the patent as granted in as much as the following features are added:
 - the pseudoplastic polysaccharides "being a broth resulting from fermentation of a pseudoplastic polysaccharide-producing microorganism" (main request);
 - an "initial" viscosity of at least 1900 mPa.s" (main request);
 - the viscosity being determined at "a shear rate of 6.28 sec⁻¹" (main request);
 - the "retentate has a viscosity exceeding 7000 mPa.s" (auxiliary requests 1 and 3);
 - "a cell-lytic enzyme is added to the fermentation broth before the ultrafiltration" (auxiliary requests 2 and 3).

As to the added feature of the solution being a fermentation broth, this is disclosed in the patent in the original description cf. on page 2, lines 27 to 39 and page 3, lines 5 to 8.

The determination of the viscosity to be carried out at a shear rate of 6.28 sec^{-1} is disclosed in Examples 1 and 2.

The added feature of the ultrafiltration being carried out until the retentate has a viscosity exceeding 7000 mPa.s follows from the disclosure on page 1, lines 22-25.

The additional feature of the cell-lytic enzyme being added to the broth is disclosed in the description from page 4, line 13 to page 6, line 23.

Thus, there are no objections with regard to Article 123(2) EPC.

2.2 All amendments of the respective main claims constitute limitations by incorporating further features into the respective main claims. Consequently there is no broadening of the scope of the claims and, thus, no objections with regard to Article 123(3) EPC are to be raised.

3. Priority (Articles 87 to 89 EPC)

3.1 In the present case the main claims of all requests contain inter alia two specific technical features relating to the molecular weight cut-off of a porous membrane being at most 65 000 and a pumping rate of at least 0.28 m/s which are undisputably not expressis verbis contained in the priority document. Thus, the question is whether or not the mentioned features change the

invention such that "the same invention" is no longer concerned, as required by Article 87(1) EPC.

3.2 Only during oral proceedings did the Appellants declare that the features in question were not necessary to establish an invention over the prior art but, rather, were trivial measurements known to skilled persons and did not contribute to the invention as such, which rather lay in the use of ultrafiltration for the polysaccharide solutions in question and that in particular there was no correlation between the molecular weight cut off and the pumping rate.

3.3 The Board also believes that the Appellants meant their invention to lie in the application of ultrafiltration in general to a broth resulting from fermentation of a pseudoplastic polysaccharide-producing micro-organism. The specific technical features which were not contained *expressis verbis* in the priority document constitute nothing more than routine choices which would normally be made by skilled persons. It follows that these specific features do not change what was believed to be "the invention" as such and that, therefore, the requirement of Article 87(1) EPC stating that priority right has to be granted "in respect of the same invention" is met.

3.4 Consequently, the claims of the requests now on file can validly rely on the priority date of the priority document. It follows that document (13) does not constitute prior art within the meaning of Article 54(3) EPC.

4. Novelty (Article 54 EPC)

Since document (13) according to the above reasons does not form part of the state of the art there are no novelty questions with respect to Article 54(3) EPC.

None of the other documents describes a process having the features of the main claim of any of the requests on file and, therefore, novelty with respect to Article 54(2) EPC is given.

5. Inventive step (Article 56 EPC)

Main request

5.1 In the Board's opinion, document (16) constitutes the closest prior art. This document discloses a method of purifying and concentrating aqueous solutions derived from marine algae by subjecting such solutions to ultrafiltration, whereby water and low molecular weight compounds in the solution are carried to pass through the membrane of the ultrafiltration equipment, while the desirable polysaccharides, such as carrageenan or alginate is retained by the membrane and is recovered in concentrated form. Examples VIII and IX demonstrate the use of ultrafiltration techniques to concentrate an aqueous solution of an alginate to a concentration of 1.9% wt and 5.3% wt respectively. The polysaccharides to be concentrated according to document (16) are pseudoplastic, typified mainly by a decrease in viscosity with increasing shear or agitation and a return to normal viscosity with ceasation of agitation. The aqueous solutions described there have a high viscosity, even at fairly low concentrations. The ultrafiltration can be carried out until a desired concentration, starting from a range of from 1 to 3% by weight to a range of from 6 to 8% by weight, is achieved. If desired, further increase of the concentration of the polysaccharide solutions obtained by ultrafiltration can be accomplished by diluting the concentrated solution with water and then reconcentrating

the diluted solution by ultrafiltration. The ultrafiltration process may be carried out under various conditions of temperature, pressure and flow rates (column 10, lines 54 to 57).

- 5.2 When dealing with solutions of pseudoplastic polysaccharide the skilled person was aware of the process disclosed in (16). The problem he had to solve was the adaptation of the known process to another starting product.
- 5.3 The solution to this problem is the subject-matter of Claim 1 of the main request. This solution comprises the features of concentrating an aqueous solution of water-soluble pseudoplastic polysaccharide being a broth resulting from fermentation of a pseudoplastic polysaccharide-producing microorganism comprising ultrafiltration.
- 5.4 From the data disclosed in the patent specification, in particular in table 1 on page 5 and the table on page 6, it seems to be plausible that the problem has been solved.
- 5.5 The comparison of the relevant features shows that the process of the patent in suit is essentially the same as that described in document (16) except for the fact that the solution to be concentrated is a broth resulting from fermentation of a pseudoplastic polysaccharide-producing microorganism. Further technical details given in Claim 1 are only of trivial and self-evident nature and do not constitute any decisive differences to the process described in the prior art document in question. Thus, with respect to the presence or absence of an inventive step for the subject-matter of Claim 1, the question to be

considered is whether the application of ultrafiltration to fermentation broths was obvious to the skilled person.

5.6 The skilled circles, looking for a concentration of solutions of pseudoplastic polysaccharides being a broth resulting from fermentation of pseudoplastic polysaccharide-producing microorganisms will find a direct proposal in document (16) to apply ultrafiltration to polysaccharide solutions of this kind. In the Board's opinion, therefore, there could only be acknowledged the existence of an inventive step if there was any kind of a prejudice preventing the skilled persons from applying ultrafiltration to fermentation broth instead of a polysaccharide solution derived from a living material like marine algae, which is not, as such, a fermentation broth. One of these prejudices could be that the cells of a microorganism, being suspended in the fermentation broth, would destroy or otherwise damage the membrane used for ultrafiltration. In this context, however, attention has to be drawn to document (4) which relates to the application of ultrafiltration to fermentation broth without any hints at possible problems of the mentioned kind. Therefore, not only is there no prejudice against an application of ultrafiltration to fermentation broth but rather there is an incentive to pursue such an application.

5.7 Since, admittedly (see paragraph 3.2 above), the other technical features of Claim 1 did not contribute further to an inventive step, the subject-matter of the main claim of the main request was, in the Board's opinion, an obvious application of a known process to an aqueous solution of pseudoplastic polysaccharides being a broth of the fermentation of a microorganism.

First auxiliary request

- 5.8 The main claim of this request contains the further technical feature of the viscosity of the retentate being at least 7000 mPa.s. This viscosity represents, compared to an initial viscosity of 1900 mPa.s, an about three-fold concentration. This degree of concentration is the one to be expected by an ultrafiltration process as becomes clear from document (16) where a concentration of that degree is likewise achieved. In applying a known process to obtain an expected effect, the skilled person would normally continue up to the desired result. This viscosity, representing a concentration degree is not at all surprising or unexpected and the Board, therefore, cannot see that this feature can establish an inventive step.

Second auxiliary request

- 5.9 The main claim of the second auxiliary request for the countries as designated in document (13) contains the further feature that a cell-lytic enzyme is added to the fermentation broth. The treatment with enzymes of a fermentation broth of microorganisms is already known from document (15). Document (19) even discloses the combination of the use of a proteolytic enzyme and an ultrafiltration process. Furthermore it is already stated in the description of the patent specification on page 3, lines 6 to 9 with reference to relevant documents that methods to clarify aqueous solutions of polysaccharides containing cell debris by enzymatic treatment have already been suggested. The use of cell-lytic enzymes in an ultrafiltration process of microorganisms, thus constitutes the evident state of the art and, therefore, the Board cannot recognise any inventive merit to this additional feature incorporated into the claim. Furthermore, as already recognised in the description of

the patent in suit (see page 3, lines 4 to 45), the improvement resulting from this feature was already known. No evidence of an unexpected effect has been submitted.

Third auxiliary request

- 5.10 This auxiliary request contains main claims which have already been discussed above, namely a main claim having the special feature of the cell-lytic enzyme applied to the fermentation broth for the countries as designated in document (13) and the feature of the viscosity of the retentate being at least 7000 mPa.s for the remaining countries. The same reasons given above for the conclusion that there is no inventive step, therefore, apply here.
6. Since the main claims of all requests are not allowable, all requests must be rejected.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

P. Lançon