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D E C I S I O N
of 22 September 1998

Case Number: T 0455/95 - 3.3.4

Application Number: 86307549.5

Publication Number: 0219269

IPC: C13K 1/08

Language of the proceedings: EN

Title of invention:
Carbohydrate refining process and enzyme compositions suitable for use therein

Patentee:
Corn Products International Inc

Opponent:
Novo Nordisk A/S

Headword:
Enzyme composition/CPI

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
-

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Case Number: T 0455/95 - 3.3.4

D E C I S I O N
of the Technical Board of Appeal 3.3.4
of 22 September 1998

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 23 March 1995 rejecting the opposition filed against European patent No. 0 219 269 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: L. Galligani
Members: F. L. Davison-Brunel
W. Moser
R. E. Gramaglia
J.-C. Saisset

Summary of Facts and Submissions

I. European patent No. 0 219 269 with the title "Carbohydrate refining process and enzyme compositions suitable for use therein" was granted with thirteen claims, on the basis of European application No. 86 307 549.5 with the priority date of 10 October 1985.

II. A notice of opposition was filed requesting the revocation of the patent under Article 100(a) EPC (lack of novelty and inventive step).

III. The Opposition Division rejected the opposition (Article 102(2) EPC).

IV. The Appellant (Opponent) filed an appeal, paid the appeal fee and submitted a written statement setting out the grounds of appeal together with six new documents.

V. The Respondent (Patentee) submitted his answer to the grounds of appeal together with two new documents.

VI. A communication was sent according to Article 11(2) of the Rules of procedure of the Boards of Appeal, setting out the Board's provisional, non-binding opinion.

VII. On 9 July 1998, the Respondent filed a further submission together with five auxiliary requests to be considered by the Board in addition to the granted claims as main request.

VIII. The Appellant submitted a reply thereto.

IX. Oral proceedings took place on 22 September 1998. The Respondent submitted a new main request (claims 1 to 12) to replace the main, first, second and third auxiliary requests on file. The fourth and fifth auxiliary requests on file were renamed first and second auxiliary requests, respectively.

X. Independent claims 1 and 8 of the new main request read:

"1. A process for the treatment of an aqueous solution which is a wheat starch hydrolysate and which is difficult to filter and/or which produces a cloudy filtrate, characterised in that the solution which contains as impurity a phospholipid is treated before filtration under conditions such that the filterability of the solution and/or the clarity of the filtrate are improved by contact with an enzyme composition containing a phospholipase enzyme and xylanase and beta-glucanase enzymes, the ratio of phospholipase enzyme to total xylanase and beta-glucanase enzymes being at least 1:1, the amounts of phospholipase, xylanase and beta-glucanase enzymes being determined by the methods described herein."

"8. An enzyme composition suitable for use in the process of any one of the claims 1 to 7 characterised in that it comprises xylanase and beta-glucanase enzymes and a phospholipase which is present in an amount of at least 5000 units/gram total protein of the enzyme composition and in which the ratio of phospholipase enzyme to total xylanase and beta-glucanase is at least 1:1, the amounts of phospholipase, xylanase and beta-glucanase enzymes being determined by the methods described herein."

XI. The following documents on file were taken into consideration by the Board:

(A10): Commercial sheet describing the enzyme preparation FINIZYM® 200L, July 81.

(A19): Letter from the producers of FINIZYM® 200L to a customer dated 18 April 1984,

(A34): "Bowler et al., in Progress in Biotechnology 1 New Approaches to Research on Cereal Carbohydrates", Proceedings of the International Conference held in Copenhagen, DK on June 24 to 29, 1984, Elsevier; Amsterdam, 1985, pages 71 to 79,

(A35): P. Bowler, 36th Starch Convention of the Arbeitsgemeinschaft Getreideforderung, Saccharification, Lecture No. 4.3, 24 to 26 April 1985, pages 1 to 12,

(A37): Advances in Cereal Science and Technology; Y. Pomeranz, ed.; American Association of Cereal Chemists, Inc., Publishers, 1976, pages 267, 296, 297,

(E4): Semi-Monthly Report, September 16-30, 1985, of CPC Europe Industrial Products submitted by the Respondent with letter dated 11 December 1995,

(E5): Letter of Cerestar dated 22 May 1995 to Mr W. M. Teague, submitted by the Respondent with letter dated 11 December 1995.

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XII. The submissions in writing and during oral proceedings by the Appellant can be summarized as follows:

- The expression "the amounts of phospholipase, xylanase and beta-glucanase enzymes being determined by the methods described herein" introduced into claims 1 and 8 lacked clarity as the description of the patent in suit cited on page 3 phospholipases A1, A2, L1, L2 and C as useful in the process of the invention without providing sufficient information on the assays to be carried out to quantify these enzymes.

- Claim 8 lacked inventive step over the combination of documents (A19) and (A35) or documents (A10) and (A37), respectively.

  Document (A19), a letter from the firm producing the enzyme composition FINIZYM® 200L to one of its clients was part of the state of the art as no confidential agreement existed between the sender and the receiver of the letter. It disclosed that FINIZYM® 200L (a multi enzyme components beta-glucanase preparation; cf. document (A10)) was useful in improving the filtration of wheat starch hydrolysate. Document (A35) reported that the presence in wheat starch hydrolysate, of a starch-lipid complex including phospholipids may affect filtration. Taking into account both these documents, the skilled person would have investigated the composition of FINIZYM® 200L i.e. would have determined that it contained phospholipase in addition to beta-glucanase. It would, thus, have been obvious to optimize the enzyme composition by increasing the ratio of

phospholipase to beta-glucanase and xylanase in order to get rid of the phospholipids known from document (A35) as a potential hindrance to filtration i.e. to produce the claimed enzyme composition.

Alternatively, one could consider document (A10) which disclosed the use of FINIZYM® 200L to destroy the beta-glucans prior to beer filtration and to document (A37) which made it clear that lipids were responsible for difficulties encountered in the clarification of beer. In the light of these two documents, it became obvious to increase the amount of phospholipase relative to the amounts of beta-glucanase and xylanase to provide an improved enzyme composition for filtration.

- The same reasoning which combined documents (A19) and (A35) could be directly applied to destroy the inventive step of the process of claim 1. The reasoning which combined documents (A10) and (A37) could equally be applied in spite of the fact that the process of claim 1 was directed to wheat starch processing, because the skilled person would have realized that the same problems occurred with wheat starch as with beer (barley being a cereal).

- The ratio of phospholipase to beta-glucanase and xylanase of 1:1 had been introduced in the claims for the purpose of establishing novelty. It had no significance for inventive step as it could be gathered from the patent description that enzyme compositions with widely ranging ratios of phospholipase to beta-glucanase and xylanase were suitable to improve filtration.

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XIII. The Respondent answered as follows:

- There could be no unclarity attached to the added expression "the amount of phospholipase, xylanase and beta-glucanase enzymes being determined by the methods described herein" because the patent provided ample information on how to assay these enzymes. Moreover, phospholipases were part of the state of the art at the filing date, as well as the methods for determining their activity.

- The problem to be solved was to provide an improved enzyme composition for wheat starch processing and a process for use thereof.

  It was not legitimate to combine the teachings of documents (A19) and (A35) in the assessment of inventive step, as there was no evidence on file that document (A19) belonged to the public domain.

  If, for the sake of argument, one was to consider this combination of documents, it would not destroy inventive step. Document (A35) disclosed that pentosans, sugars and inorganic materials were responsible for problems in wheat starch filtration. With regard to lipids, it was only stated that monoacyl lipids (which are not necessarily phospholipids) "may affect filtration". To argue that this vague teaching coupled with the knowledge that a beta-glucanase composition containing a phospholipase as impurity was helpful in filtration (document (A19)), made it obvious to increase the amount of the "phospholipase impurity" in said composition to improve its effect on filterability, amounted to an *a posteriori* analysis of the state of the art which took into account the subject-matter of the patent in suit.

- The combination of documents (A10) and (A37) was irrelevant to inventive step for two reasons. Firstly, these documents dealt with beer filtration which was a different technical field. Secondly, although document (A37) discussed the effect of lipids on the quality of beer in general, it also disclosed that phospholipids "appear to be almost absent" from beer wort (page 297).

XIV. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 219 269 be revoked.

The Respondent (Patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the following documents:

(a) claims 1 to 12, filed during oral proceedings **as main request**; or

(b) **as first auxiliary request**: claims 1 to 12, filed on 9 July 1998 as fourth auxiliary request; or

(c) **as second auxiliary request**: claims 1 to 7, filed on 9 July 1998 as fifth auxiliary request.

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Reasons for the Decision

1. The appeal is admissible

Late filed documents

2. Documents were filed late by both parties. In view of their prima facie relevance, they are all admitted into the proceedings.

Main claim request

Articles 123(2)(3), 84 and 54 EPC

3. No objections have been raised by the Appellant against the main claim request under Articles 123(2)(3) and 54 EPC. The Board is of the opinion that the requirements of these articles are fulfilled.

4. It has been argued that the expression added at the end of claims 1 and 8, "the amount of phospholipase, xylanase and beta-glucanase enzymes being determined by the methods described herein" was unclear because the patent in suit did not provide the information necessary to assay the phospholipases. Yet, pages 4 and 5 of the application as filed define the structure of the substrates for the various phospholipases and indicate how to determine phospholipase activity. Examples (a) and (b) give detailed information on how to estimate the activity of phospholipases with L or C activity. Thus, no objection is seen by the Board. The requirements of Article 84 EPC are fulfilled.

Article 56 EPC

5. Document (A19) is a letter from the firm selling the enzyme composition FINIZYM® 200L to one of its customers informing him that the use of the enzyme improves the filtration of wheat starch in wheat starch processing. The Respondent argued that at the filing date, the information contained in this letter was not state of the art within the meaning of Article 54(2) EPC because both the sender and the recipient of the letter would have assumed it to be confidential. In the Board's judgment, the unsubstantiated assertion made by the Respondent that an assumption of confidentiality existed between the sender and the receiver of the letter is not sufficient to prove the very existence of such confidentiality. There is no evidence on file to show that there indeed existed an agreement of confidentiality between both parties involved. Thus, the information contained in document (A19) is considered to belong to the state of the art pursuant to Article 54(2) EPC at the filing date.

6. The information contained in Document (A19) is considered to represent the closest prior art for the subject-matter of the claim 8. Now, it is not disputed that FINIZYM 200L contains a phospholipase as impurity in an amount of at least 5000 units/gram of total protein and that the ratio of phospholipase to total beta-glucanase and xylanase in the composition is **below** 1:1. However, this information cannot be deduced neither from document (A19) nor from any documents such as document (10), which are concerned with the enzyme preparation.

7. Starting from the closest prior art, the technical problem to be solved is to provide an improved enzyme composition for wheat starch filtration and a process for use thereof.

8. The solution is the enzyme composition of claim 8 made of phospholipase, beta-glucanase and xylanase wherein the ratio of phospholipase to total xylanase and beta-glucanase is **at least** 1:1. The Respondent submitted an experimental report (documents (E4) and (E5)) which shows that the presence in the composition of a significant amount of phospholipase relative to the other two enzymes induces filtration improvement. These results are not challenged by the Appellant. The Board is, thus, satisfied that the problem has been solved.

9. The difference between the claimed composition and FINIZYM® 200L resides in the fact that the relative amount of phospholipase to beta-glucanase and xylanase is increased in the claimed composition. The assessment of inventive step, thus, requires to determine whether it would have been obvious to the skilled person that phospholipids were the cause for some of the difficulties encountered in filtration, and that, therefore, an enzyme preparation for use in alleviating filtration problems should contain phospholipase in substantial amount.

10. Document (A35) discusses the minor components of wheat starch which may have an effect on glucose syrup production, with specific reference to filterability (pages 7 to 11). The coagulatable polymers and free particulate material are found "to blind the filter". The pentosans present in the insoluble residue are thought to have an adverse effect on filterability. As for resistant starch, it is said to contain a substantial amount of an amylose-monoacyl-lipids complex which "may also affect filtration" depending on the method used to produce the syrup. The term monoacyl-lipids is to be understood as comprising a phospholipid, namely lysophosphatidylcholine, and free fatty acids (document (A34)). Document (A35) is silent on the necessity and feasibility of removing the

starch-lipids complex, on the amount of phospholipid it contains, on the accessibility of this complexed phospholipid to phospholipases, and on the effect its enzymic degradation (if occurring) might have on the filtration of wheat starch syrup.

11. In the Board's judgment, inferring from this rather scanty teaching that an improvement in the filterability of wheat starch syrup can be expected if the syrup is treated with an enzyme composition which differs from that of document (19) in that it contains a higher amount of phospholipase relative to beta-glucanase and xylanase is a mental leap which could not have been made by the skilled person at the filing date, considering that he/she was not even aware that FINIZYM® 200L contained some phospholipase. Accordingly, the subject-matter of claim 8 involves inventive step over the combination of documents (A19) and (A35).

12. The process of claim 1 is carried out with an enzyme preparation characterized by the feature of containing a high ratio of phospholipase to beta-glucanase and xylanase, feature which is considered inventive (see above). Therefore, it complies with the requirements of Article 56 EPC.

13. The Appellant also argued that the combination of documents (A10) and (A37) destroyed inventive step. Yet, none of these documents are related to wheat starch filtration. Their combination has therefore less bearing on inventive step than the combination of documents (A19) and (A35). Furthermore document (A37), page 297 discloses that "the free fatty acids are the most abundant lipid group in wort and the other groups such as glycerides and **phospholipids** appear to be

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almost absent" (emphasis added). Therefore the combination of documents (A10) and (A37) is not relevant to the inventive step to claims 8 and 1 which relate to the enzymic degradation of phospholipids in wheat starch.

14. The requirements of Article 56 EPC are fulfilled.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:

   - claims 1 to 12, filed during oral proceedings as main request;

   - pages 2 to 4 of the description, submitted during oral proceedings;

   - pages 5 and 6 of the description as granted

The Registrar: The Chairman:

D. Spigarelli L. Galligani