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Datasheet for the decision of 13 November 2007

Case Number: T 0898/06 - 3.3.03

Application Number: 95908555.6

Publication Number: 0721471

IPC: C08B 31/12

Language of the proceedings: EN

Title of invention:
Thermally inhibited starches and flours and process for their production

Patentee:
National Starch and Chemical Investment

Opponent:
Cerestar Holding B.V.
ROQUETTE FRERES, S.A.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 123(2)
EPC R. 57a

Relevant legal provisions (EPC 1973):
-

Keyword:
"Main request - novelty (no)"
"1st and 2nd auxiliary request - clarity (no)"
"3rd auxiliary request - inventive step (no)"
"4th auxiliary request - novelty (yes); inventive step (yes)"

Decisions cited:
T 0068/85

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0898/06 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 13 November 2007

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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office dated 17 June 2004 and posted 13 April 2006 concerning maintenance of European patent No. 0721471 in amended form.

Composition of the Board:

Chairman: C. Idez
Members: W. Sieber
H. Preglau

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 721 471, in respect of European patent application no. 95908555.6, based on International application PCT/US95/00684, in the name of National Starch and Chemical Investment Holding Corporation, filed on 18 January 1995 and claiming priority of PCT/US94/08559 (29 July 1994) and US 296211 (25 August 1994), was published on 4 October 2001 (Bulletin 2001/40). The granted patent contained 17 claims, whereby Claims 1, 3, 4, 8, 10, 11, 15 and 16 read as follows:

"1. A thermally-inhibited, non-pregelatinized granular waxy starch or flour which is prepared by

(a) dehydrating a non-pregelatinized granular waxy starch or flour to a moisture content of less than 1% by weight to render the waxy starch substantially anhydrous or anhydrous; and
(b) heat treating the substantially anhydrous or anhydrous waxy starch or flour at a temperature of 100°C or greater for a period of time sufficient to inhibit the waxy starch or flour.

3. The waxy starch or flour of claim 2, wherein the pH is 7.5-10.5, wherein the heating temperature is 120-180°C, and wherein the heating time is up to 20 hours.

4. The waxy starch or flour of claim 3, wherein the pH is 8-9.5, wherein the heating temperature is 140-160°C, and wherein the heating time is 3.5-4.5 hours.

8. A process for making a thermally-inhibited, non-pregelatinized granular starch or flour which comprises the steps of

(a) dehydrating a non-pregelatinized granular starch or flour to a moisture content of less than 1% by weight to render the starch substantially anhydrous or anhydrous; and
(b) heat treating the substantially anhydrous or anhydrous starch or flour at a temperature of 100°C or greater for a period of time sufficient to inhibit the starch or flour.

10. The process of claim 9, wherein the pH is 7.5-10.5, wherein the heating temperature is 120-180°C, and wherein the heat treating time is up to 20 hours.

11. The process of claim 10, wherein the pH is 8-9.5, wherein the heating temperature is 140-160°C, and wherein the heating time is 3.5-4.5 hours.

15. The process of claim 14, wherein the starch is selected from the group consisting of banana, corn, pea, potato, sweet potato, barley, wheat, rice, sago, amaranth, tapioca, sorghum, a waxy starch, and a starch containing greater than 40% amylose.

16. The starch of claim 15, wherein the waxy starch is waxy maize, V.O. hybrid waxy maize, waxy rice, waxy barley, waxy potato, or waxy sorghum."

Claims 2, 5-7, 9 and 12-14, 17 were dependent claims directed to preferred embodiments of the subject-matter of Claims 1 and 8, respectively.

II. Notices of opposition were filed by Cerestar Holding B.V. (Opponent 01) on 2 July 2002 and Roquette Frères S.A. (Opponent 02) on 3 July 2002. Both opponents opposed the patent on the grounds that its subject-matter was not patentable within the terms of Articles 54 and 56 EPC (Article 100(a) EPC), and that the invention was not sufficiently disclosed (Article 100(b) EPC).

The following documents were *inter alia* cited during the opposition procedure:

D1: *Irving Martin*, "Crosslinking of Starch by Alkaline Roasting", Journal of Applied Polymer Science, vol. II, 1967, pages 1283-1288;

D2: US-A-2 410 813;

D9: *O.B. Wurzburg*, "Modified Starches: Properties and Uses", CRC Press, Inc., Boca Raton, Florida, 1986, pages 3-53; and

D10: US-A-3 977 897.

During prosecution of the case before the Opposition Division, the Proprietor filed amended sets of claims by way of a main request and various auxiliary requests.

III. By an interlocutory decision which was announced orally on 17 June 2004 and issued in writing on 13 April 2006, the Opposition Division maintained the patent in amended form based on the claims of the Proprietor's fifth auxiliary request filed at the oral proceedings of 17 June 2004.

The fifth auxiliary request contained 9 claims whereby Claim 1 read as follows:

"A process for making a thermally-inhibited, non-pregelatinized granular starch or flour which comprises the steps of

(a) raising the pH of the ungelatinized granular starch or flour to neutral or greater;
(b) dehydrating the non-pregelatinized granular starch or flour of step (a) to a moisture content of less than 1% by weight to render the starch substantially anhydrous or anhydrous; and
(c) heat treating the substantially anhydrous or anhydrous starch or flour at a temperature of 100°C or greater for a period of time sufficient to inhibit the starch or flour wherein the heat treating takes place in a fluidised bed reactor."

Dependent Claims 2-9 were based on Claims 10-12 and 14-17 as granted.

The following points were addressed in the decision:

(i) The Proprietor had contested the admissibility of D1 because it did not constitute an enabling disclosure. However, the Opposition Division held

that the question whether a piece of prior art was reproducible did not affect its admissibility. Accordingly, there was no reason not to admit D1 which was filed with the notice of opposition into the proceedings.

(ii) According to the Opposition Division, only the claims of the Proprietor's 5th auxiliary request met the requirements of the EPC.

As regards novelty, it was pointed out that D1, the only relevant document in this context, did not disclose the use of a fluidized bed reactor for the heat treatment in the preparation of thermally inhibited starches.

As regards inventive step, D1 was considered to represent the closest prior art. The problem to be solved by the claimed subject-matter was the provision of a thermal inhibition process which resulted in a shortened process time while achieving starches with higher peak viscosities. Neither D1 alone nor D1 in combination with D2, D9 or D10 suggested the use of a fluidized bed reactor as a solution to this problem.

IV. Notices of appeal against the above decision were filed on 13 June 2006 by Opponent 01 (Appellant Opponent 01) and the Proprietor (Appellant Proprietor), the prescribed fees being paid on the same day.

V. With its statement of grounds of appeal, filed on 18 August 2006, Appellant Opponent 01 requested accelerated processing of the appeal in view of the

delays accrued during the opposition procedure. Since, furthermore, the delays originated from the adaptation of the patent specification, a referral to the Enlarged Board of Appeal concerning the adaptation of the patent specification in an interlocutory decision was requested. Further it was requested that the costs for the proceedings were completely taken up by the Proprietor in order to avoid any further attempt by the Proprietor to prolong the proceedings (in this context see point XIV(i), below).

As to the merits of the appeal, Appellant Opponent 01 agreed with the Opposition Division in respect of the refusal of the main request and the first to fourth auxiliary requests. However, the fifth auxiliary request was not patentable as it was not based upon an inventive step. As stated in the decision under appeal, the feature of Claim 1 of the fifth auxiliary request which conferred novelty over the disclosure of D1 (the closest prior art) was that the heat treating occurred in a fluidized bed reactor instead of a forced air oven. There was no evidence in the contested patent that the use of a fluidized bed reactor produced a different product compared to a conventional oven. Rather, it was claimed that the use of a fluidized bed reactor allowed a desired level of inhibition (eg moderate) to be achieved in a shorter time. Hence the problem to be solved was how to provide a thermal inhibition process which resulted in a shortened process time to achieve a given (desired) level of inhibition. However, fluidisation of starch in a fluidized bed reactor had been known since at least 1958 as could be seen from the following documents submitted with the statement of grounds of appeal:

D12: US-A-2 845 368;

D13: US-A-3 484 287;

D14: US-A-4 237 619; and

D15: US-A-4 021 927.

Optimising the process of D1 by the use of a fluidized bed reactor could not be considered inventive since D12-D15 clearly demonstrated that a fluidized bed reactor was a well-known technology and actually solved the drawbacks of the conventional processes. It was an obvious choice to use the fluidized bed reactor for the improvement of the thermal inhibition of process disclosed in D1 and the so-called superior starches produced were merely the logical consequence of the improved efficiency of the process.

VI. A statement setting out the grounds of appeal and including a main request and two auxiliary requests was filed by the Appellant Proprietor on 23 August 2006.

The claims of the main request corresponded to the claims as granted except that in Claim 16 the expression "The starch of claim 15 …" had been substituted by "The process of claim 15 …".

Furthermore, the following documents were filed (numbering by the Board):

D16: Declaration of Professor Richard Tester dated 3 May 2006;

D17: Statutory Declaration of Peter Trzasko dated 28 April 2006;

D18: Declaration of Robert L. Billmers dated 17 August 2006;

D19: "Starch: Chemistry and Technology", ed. R.L. Whistler and E.F. Paschall, vol. I, Academic Press, New York and London, 1965, page 399;

D20: evidence for better flavour release (2 pages);

D21: evidence that the starches of the patent in suit won international acclaim and recognition (5 pages);

D22: Declaration of Neil Grimwood dated 18 August 2006; and

D23: US-A-3 555 009.

The arguments presented by the Appellant Proprietor may be summarized as follows:

The Opposition Division was wrong to admit Dl as valid prior art and was wrong in considering it to be novelty destroying. As read by the skilled person, D1 was speculative, (it appeared from a literature search, D18, that no further work had ever been undertaken), contradictory and erroneous. For example, there was the highly doubtful allegation of 0% moisture content in the samples of D1. Further, the viscosity profile of the corn starch control in D1 was entirely wrong. Thus,

D1 was a document which did not in fact convey to the skilled reader any reliable information but rather left the skilled reader with the impression that the apparent disclosure of the document was wrong, irreproducible and imposed an undue burden on the skilled reader to establish what the author of D1 (Martin) did do. Hence, despite its earlier publication date D1 was not an enabling document and thus not prior art at all. In order to support its argumentation, the Appellant Proprietor relied upon D16-D19 and D23.

Even if D1 was taken as prior art, in the light of the submissions on the errors inherent in Dl and the way in which it would be understood through the eyes of the skilled person it did not disclose a moisture content of less than 1%. It emerged from the evidence of Professor Tester (D16) that even using thinner sample layer (Tester's 1.5 mm *cf* Martin's $^{3}/_{16}$ inch (4.8 mm)), Professor Tester could only get down to approximately 0.9% moisture content. This made it inconceivable that Martin had in fact achieved 0% moisture content or anything even approaching it. Thus, D1 did not disclose thermally-inhibited, non-pregelatinized granular waxy starch or flour, nor a process for making a thermally-inhibited, non-pregelatinized granular starch or flour as claimed in the patent in suit. Further, there was no clear and unmistakable teaching in D1 that the starch material used in D1 was non-pregelatinized and granular.

D1, viewed through the eyes of the skilled person, was also not a document from which the skilled person would start to solve the problem of achieving non-chemically modified starches matching in properties, especially

high viscosities, chemically inhibited starches for the purpose of achieving superior performance in food technology applications. Further, the starches produced by the patent in suit were unique in that they exhibited superior characteristics and benefits, particularly superior viscosity, without the need for chemical modification. As such, the starches of the patent in suit were "clean labelled" in that they could be claimed as natural and/or organic starches, yet had the superior functionality of modified starches. Further, the starches allowed for better flavour release in the final product compared to when chemically crosslinked starches were used as shown by D20.

VII. With its response dated 10 January 2007, Appellant Opponent 01 filed the following further document:

D24: Decision of the Opposition Division in EP 1038882 (divisional application of the patent in suit).

Further, Appellant Opponent 01 argued that D1 belonged to the state of the art; the skilled reader would, in the light of his/her general knowledge and of technical reality, disregard and/or correct the alleged technical errors in D1. Furthermore, the declaration of Professor Tester actually demonstrated that D1 was reproducible since thermally inhibited starches were obtained by Professor Tester by following the method of D1.

In addition, observations with respect to the Appellant Proprietor's auxiliary requests were presented.

VIII. In a letter dated 16 January 2007, the Appellant Proprietor filed new 1st to 4th auxiliary requests and the following document:

D25: Declaration of James J. Kasica dated 16 January 2007.

The experiments carried out under the supervision of James J. Kasica confirmed Appellant Proprietor's arguments with regard to D1. In fact, D25 proved again that the moisture content according to D1 must have been considerably higher than 1%. Further, with respect to the fluidized bed processed starch, the fluidized bed allowed higher peak viscosities to be reached and the starches had less impurities, resulting in an improved starch.

IX. In a letter dated 8 May 2007, Appellant Opponent 01 filed the following documents:

D26: GB-A-801 524; and

D27: US-A-3 527 606.

According to Appellant Opponent 01, these documents were extremely relevant to the patentability of the invention claimed by the Appellant Proprietor, particularly as put forward in the auxiliary requests.

X. In a letter dated 26 July 2007 the Appellant Proprietor filed new 1st to 6th auxiliary requests and the following documents:

D28: Experimental Data of James J. Kasica dated 20 July 2007; and

D29: *P. Tomasik et al*, "The Thermal Decomposition of Carbohydrates. Part II. The Decomposition of Starch", in Carbohydrate Chemistry and Biochemistry, vol. 47, 1989, pages 279-343.

The Appellant Proprietor emphasized that D16 (declaration of Professor Tester) and D25 (declaration of James J. Kasica) proved that D1 was not reproducible. Furthermore, the experimental data in D28 showed that the products obtained by a fluidized bed drier differed from products obtained by an oven.

XI. In a letter dated 5 October 2007, Appellant Opponent 01 commented on various auxiliary requests filed by the Appellant Proprietor.

XII. In a letter dated 23 October 2007, the Appellant Proprietor refiled the main request (point VI, above) and filed new 1st to 6th auxiliary requests and the following documents:

D28': Original of D28;

D30: Statutory Declaration of Karen G. Kaiser and James P. Zallie dated 18 October 2007; and

D31: *R. Hoover et al*, "The Effect of Heat-Moisture Treatment on the Structure and Physiochemical Properties of Normal Maize, Waxy Maize, Dull Waxy Maize and Amylose V Starches", J. of Cereal Science, 23 (1996), 153-162.

(i) The claims of the 1st auxiliary request corresponded to the claims of the main request except that at the end of Claims 1 and 8 the following wording had been added:

"…, wherein the dehydrating and heat treating steps are conducted under conditions to avoid degradation or hydrolysis of the starch or flour".

(ii) The claims of the 2nd auxiliary request corresponded to the claims of the main request except that at the end of Claims 1 and 8 the following wording had been added:

"…, wherein the dehydrating and heat treating steps are conducted by the application of dry heat in air or in an inert gaseous environment".

(iii) The remaining auxiliary requests have been substituted by other auxiliary requests in the course of the appeal proceedings and therefore will not be discussed in further detail.

XIII. Opponent 02 (Respondent Opponent 02) made no submissions at all.

XIV. On 13 November 2007, oral proceedings were held before the Board at which Respondent Opponent 02 was not represented. Since it had been duly summoned, however, the oral proceedings were continued in its absence in accordance with Rule 71(2) EPC.

(i) Appellant Opponent 01 withdrew its request concerning the referral to the Enlarged Board of Appeal as well as its request for costs.

(ii) As regards the main request, the discussion focussed on the question as to whether or not the process of Claim 8 was novel over D1. In this context, both parties basically relied upon their written submissions.

(iii) Appellant Opponent 01 argued that the amendment of Claims 1 and 8 of the 1st auxiliary request gave rise to objections under Articles 83 and 84 EPC.

(iv) Appellant Opponent 01 objected to the amendment of Claims 1 and 8 of the 2nd auxiliary request under Article 84 EPC.

(v) Following the discussion of the main, 1st and 2nd auxiliary requests, the Appellant Proprietor filed new 3rd to 8th auxiliary requests.

(vi) The new 3rd auxiliary request contained 7 claims which corresponded to Claims 1-7 of the main request and therefore to Claims 1-7 as granted.

(vii) The new 4th auxiliary request contained 16 claims, whereby Claims 1, 3, 4, 8, 10 and 11 read as follows:

"1. A thermally-inhibited, non-pregelatinized granular waxy starch or flour which is prepared by

(a) dehydrating the non-pregelatinized granular waxy starch or flour to a moisture content of less than 1% by weight to render the waxy starch substantially anhydrous or anhydrous; and
(b) heat treating the substantially anhydrous or anhydrous waxy starch or flour at a temperature of 100°C or greater for a period of time sufficient to inhibit the waxy starch or flour,
wherein the dehydrating and heat treating steps are conducted in a fluidized bed reactor or drier.

3. The waxy starch or flour of claim 2, wherein the pH is 7.5-10.5.

4. The waxy starch or flour of claim 3, wherein the pH is 8-9.5.

8. A process for making a thermally-inhibited, non-pregelatinized granular starch or flour which comprises the steps of

(a) dehydrating the non-pregelatinized granular starch or flour to a moisture content of less than 1% by weight to render the starch substantially anhydrous or anhydrous; and
(b) heat treating the substantially anhydrous or anhydrous starch or flour at a temperature of 100°C or greater for a period of time sufficient to inhibit the starch or flour,
wherein the dehydrating and heat treating steps are conducted in a fluidized bed reactor or drier.

10. The process of claim 9, wherein the pH is 7.5-10.5.

11. The process of claim 10, wherein the pH is 8-9.5."

Dependent Claims 2, 5-7, 9 and 12-16 were based on Claims 2, 5-7, 9, 12 and 14-17 as granted.

(viii) The 5th to 8th auxiliary requests are not relevant to this decision and will therefore not be discussed in further detail.

(ix) Appellant Opponent 01 requested that the 3rd to 8th auxiliary requests not be admitted into the proceedings.

(x) As regards the 3rd auxiliary request, Appellant Opponent 01 argued that the subject-matter of Claim 1 was neither novel nor based on an inventive step. The Appellant Proprietor argued that D1 did not clearly and unambiguously disclose a thermally-inhibited, non-pregelatinized granular waxy starch. As regards the hint in D1 to waxy starch, this was nothing more than an invitation to the skilled person to start a research program. Further, the skilled person would know from D10 that waxy and non-waxy starch performed differently.

(xi) As regards the 4th auxiliary request, Appellant Opponent 01 objected to amended Claims 1 and 8 under Articles 123(2) and 84 EPC and to Claims 3, 4, 10 and 11 under Rule 57a EPC.

Appellant Opponent 01 raised no novelty objection with respect to the subject-matter claimed in the 4th auxiliary request.

Appellant Opponent 01 considered D1 to represent the closest prior art and saw the problem to be solved over the closest prior art in the provision of a more efficient drying and heat treating apparatus. Nothing inventive could be seen in replacing one standard equipment by another one which was known to be more efficient (eg D12, D13, D15, D26 and D27), especially since the type of equipment had no influence on the product.

The Appellant Proprietor emphasized that the products obtained by the claimed process differed from those obtained by a conventional oven. The side by side comparison in D28 demonstrated this difference as well as the superiority of the products with respect to their viscosity behaviour. None of the cited documents actually suggested that the use of a fluidized bed drier would provide these advantages.

(xii) Following the discussion of the claims of the 4th auxiliary request, the Appellant Proprietor filed, in connection with the claims of the 4th auxiliary request, an accordingly amended patent specification, namely pages 2 to 4, 6, 9, 10, 12, 22 and 23. Appellant Opponent 01 raised no objections against the amended patent specification.

XV. Appellant Opponent 01 requested that the decision under appeal be set aside and the patent be revoked.

XVI. The Appellant Proprietor requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of

Claims 1 to 17 filed as main request with letter dated 23 October 2007, or, in the alternative, on the basis of

Claims 1 to 17 of either the 1st or 2nd auxiliary request filed with letter dated 23 October 2007, or

Claims 1 to 7 of the 3rd auxiliary request, or

Claims 1 to 16 of the 4th auxiliary request, or

Claims 1 to 7 of the 5th auxiliary request, or

Claims 1 to 16 of the 6th auxiliary request, or

Claims 1 to 15 of the 7th auxiliary request, or

Claims 1 to 14 of the 8th auxiliary request,

all filed at the oral proceedings of 13 November 2007,

and a description, pages 5, 7, 8, 11, 13 to 21 of the patent specification and pages 2 to 4, 6, 9, 10, 12, 22 and 23 as filed during the oral proceedings of 13 November 2007 in connection with the 4th auxiliary request.

XVII. The Respondent Opponent 02 did not file any request.

Reasons for the Decision

1. The appeals comply with Articles 106 and 108 EPC and Rule 64 EPC and are therefore admissible.

2. *Main request*

2.1 Amendments (main request)

The claims of the main request (points VI and XII, above) corresponded to the claims as granted except that in Claim 16 the erroneous reference to "The starch of claim 15 …" has been amended to "The process of claim 15 …". Since no further amendments have been made, no objections under Articles 123(2)/(3) or 84 EPC arise. Nor was any objection raised by Appellant Opponent 01 in this context.

2.2 Novelty (main request)

2.2.1 The only relevant document with respect to novelty is D1.

D1 describes a process comprising heat treating a substantially anhydrous commercial corn starch. Specifically, Dl describes a procedure where in a first step a commercial corn starch was mixed with a solution containing sodium bicarbonate (page 1283, fifth line from the bottom of the page). The commercial corn starch used in Dl was not a waxy corn starch since this is mentioned in Dl as an alternative to the commercial

corn starch (page 1286, line 6). The procedure described in Dl for the preparation of the alkali-impregnated corn starch involves a step of filtering the impregnated starch from suspension in a solution of sodium bicarbonate (page 1283, second line from the bottom of the page). As pointed out by Appellant Opponent 01, such a filtration could have been carried out only with a granular, non-pregelatinized starch. The starch of D1, therefore, had to be a non-pregelatinized, granular starch.

According to page 1284 of Dl, the alkali-impregnated starch (which, as stated above, was not a waxy starch and which must have been a non-pregelatinized granular starch) was pre-dried to a moisture content of 7% and then placed in a forced-air oven. The temperature of the oven was raised as quickly as possible (about 1 hour) to 140°C and kept at this temperature (*roasting temperature*). When the oven first reached 140°C, the moisture content of the dried starch was determined to be 0%. The dried starch was then heated at 140°C for six hours (to give sample I_6) or for eight hours (to give sample I_8). Both I_6 and I_8 samples exhibited a retarded rise and a retarded fall in viscosity compared to the untreated corn starch (Dl, page 1285, Figure 1). Furthermore, it is stated on page 1285, 1st full paragraph, that "These experiments (and a number of unreported series of similar ones) suggest that alkaline roasting produces covalent crosslinks". The fact that Martin (the author of D1) uses the word "suggest" indicates his caution in drawing conclusion. Nevertheless, it is apparent from D1, in particular Figure 1 and the above mentioned statement, that the dry roasting affects starch in a way that resembles

chemical crosslinking. Furthermore, the roasted starches of D1 exhibit the viscosity behaviour of a thermally-inhibited starch as set out in paragraph [0054] of the patent in suit.

2.2.2 It is evident from the above analysis that D1 already describes a process as claimed in Claim 8 of the main request. Thus, the process of Claim 8 of the main request is not novel over D1.

2.3 The Appellant Proprietor attempted to discredit D1 as a valid piece of prior art because D1 was speculative, contradictory and erroneous. According to the Appellant Proprietor, it was thus an example of a document which did not in fact convey to the skilled reader any reliable information, but rather left the skilled reader with the impression that the apparent disclosure of the document was wrong, irreproducible and imposed an undue burden on the skilled reader to establish what Martin did do. This left the skilled reader unable to discern the technical reality behind D1. Thus, despite its earlier publication date D1 was not an enabling document and thus not prior art at all.

According to the Appellant Proprietor, this view was supported by a number of unusual or freak results "reported" by Martin in D1 which would immediately be noticed by the skilled person. Notable examples included:

– The highly doubtful allegation to 0% moisture content in the samples (in this context D16 and D25 were cited).

- The anomalous form of the corn starch control Brabender/Amylograph viscosity/temperature curve, returning as it did to the baseline (in this context reference was made to D19).
- The anomalous Brabender/Amylograph viscosity/ temperature curves for the samples A and B in Figure 1 of D1.
- The hydrolysis for the I_6 and I_8 samples which was evident from their Brabender/Amylograph viscosity/ temperature curves, yet would not be possible without the presence of water (ie 0% moisture reported by D1).

In particular, D1 was erroneous in that it reported 0% moisture content but contained Brabender curves indicating hydrolysis. The presence of water, discussing sample degradation, and speculating on the presence of water were all indicative to the skilled person of the presence of significant moisture content in the samples. Furthermore, it had been established by the experiments of Professor Tester (D16) and James J. Kasica (D25) that it had not been possible to reproduce the work of Martin or his results. It emerged from the evidence of D16 that even using thinner sample layer, Professor Tester could only get down to approximately 0.9 % moisture content. This made it inconceivable that D1 did in fact achieve 0% moisture or anything even approaching it. Thus, even if D1 was taken as prior art, in spite of the submissions on the errors inherent in D1 and the way in which it would be understood through the eyes of the skilled person, it did not disclose a moisture content of less than 1% by weight.

2.4 However, the Board cannot follow this line of argumentation for the following reasons:

2.4.1 D1 describes a treatment performed on alkaline dry starch and describes the effect of this on the properties of the starch. The treatment, succinctly stated in line 2 of the "Introduction" on page 1283 of D1, comprises "heating dry starch in air - at an alkaline pH - …". The second paragraph of the "Introduction" states:

"Much work has been done on the aerobic alkaline heating of *wet* polysaccharides, little on dry polysaccharides. I hope this publication will stimulate others to investigate this subject more thoroughly."

The above passages indicate clearly that Martin was not interested in investigating the effect achieved by heat treating water-containing alkaline starch. It is even acknowledged that this has been investigated before. Therefore, a person skilled in the art would be well aware when reading Dl that it is **not** the subject-matter of D1 to degrade starches by heating them in the presence of moisture at a temperature of 140°C, but on the contrary, that it is the subject-matter of D1 to heat **dry starch** at a temperature of 140°C and to avoid the well-known phenomenon of hydrolysis. D1 states that the moisture content of the alkali-impregnated corn starch, at the end of the dehydrating step and before the heat treatment/roasting step is 0%. D1, therefore, instructs a person skilled in the art to measure the moisture content of the starch before the heat treatment/roasting procedure. Furthermore, D1 discloses that the process procedure "involved heating a dry

mixture of starch and base in a thin layer at 140-160°C" (D1, page 1283, 9th line from the bottom of the page). Even if it were true that Martin did not achieve 0% moisture content (as suggested by the repetitions of the Martin experiment in D16 and D25), the statement in D1 that the moisture content after the dehydrating step but before the heat treatment/roasting step was 0% at least indicates to a person skilled in the art that where Martin talks of "dry starch" he means starch with as small a moisture content as possible (ie as close to 0% as possible). D1, thus, clearly teaches the person skilled in the art the importance of using dry (as opposed to moisture-containing) starch for the heat treatment/roasting step.

2.4.2 Further the Appellant Proprietor argued that the Brabender/Amylograph viscosity temperature/curve of the control corn starch sample in Figure 1 of D1 was unexpected and wrong and cited D19 as providing confirmation for this argument. However, it is conspicuous to the Board that the dispersion of untreated corn starch used to produce the curve shown in Figure 1 of D1 contained 6% starch and had a pH of 3.0 (D1, page 1285, Figure 1). D19 does not identify the pH of the starch suspension used to produce the curve. Thus, D19 appears not suitable to provide evidence for the correctness of the statement made by the Appellant Proprietor.

2.4.3 The Appellant Proprietor also argued that the Brabender/Amylograph viscosity/temperature curves presented in D1 for the chemically crosslinked starches A and B were unexpected and "wrong" which was

a further indication that there was something unusual and erroneous about Martin's work and his results. However, D1 does not specify the details for preparing samples A and B. It merely refers to covalently crosslinking corn starch with epichlorydrin (0.3 and 0.4 wt%, respectively) in aqueous suspension according to a conventional method including a US patent. Thus, it appears impossible to deduce from D1 how the chemically crosslinked starches were actually prepared. Hence, a comparison between curves of the chemically crosslinked starches A and B in D1 and the curves of the chemically crosslinked starches in D16 appears not feasible. In any case, as explained above, the focus of Martin's research was the results reported for the dry roasted starches and these new data, rather than whether or not the curves presented for the chemically crosslinked derivatives were accurate, would have been the focus for the skilled person.

2.4.4 According to the Appellant Proprietor, the viscosity curves of I_6 and I_8 in Figure 1 of D1 indicated that hydrolysis had taken place during the roasting of I_6 and I_8. This was a further indication that the 0% moisture reported in D1 was wrong (at 0% moisture hydrolysis would not be possible). Even if this is true and the curves of I_6 and I_8 in Figure 1 of D1 represent two inhibited starches which have been partially degraded by hydrolysis, the implicit teaching of D1, ie to dehydrate starch to a low moisture level before heating/roasting the starch, would still be valid.

2.4.5 Finally, it appears that the question as to whether or not D1 actually reached a moisture content of below 1% before the heat treatment is irrelevant in view of the

actual breadth of the process defined in Claim 8. It is explicitly stated in paragraph [0016] of the patent in suit that "in one embodiment, the dehydrating and heat treating steps occur simultaneously". Claim 12 of the main request also refers to this embodiment. If, however, dehydrating and heat treating are carried out simultaneously, it is inevitable that heat treating takes place before all the starch has reached a moisture content of less than 1% by weight. Thus, even if the moisture content in D1 was not less than 1% by weight at the beginning of the heat treating, it appears that the process of D1 is still covered by the process of the patent in suit. Therefore, the Appellant Proprietor's argument that D1 cannot be novelty destroying because a moisture content of less than 1% by weight was not reached in D1 is pointless.

2.4.6 In view of the above, a person skilled in the art would, in reality, not completely write off the whole of the teaching in D1 in the way suggested by the Appellant Proprietor but would, if he/she suspected any inaccuracy, conduct his/her own experiments with an earnest desire to make them work despite the suspected inaccuracy. This, apparently, is what has been done by Professor Tester and James J. Kasica in D16 and D25, respectively. Consequently, the Board agrees with the finding in the decision under appeal that D1 is state of the art according to Article 54(2) EPC.

2.5 In summary, D1 is valid prior art under Article 54(2) EPC and novelty destroying to the process of Claim 8. Consequently, the main request has to be refused.

3. *1st auxiliary request*

3.1 The claims of the 1st auxiliary request (point XII(i), above) correspond to the claims of the main request except that at the end of Claims 1 and 8 the following wording has been added:

"… wherein the dehydrating and heat treating steps are conducted under conditions to avoid degradation or hydrolysis of the starch or flour".

The limitation introduced into Claims 1 and 8 finds its support in the second paragraph on page 3 of the application as originally filed. Thus, no objection under Article 123(2) or (3) EPC arises.

3.2 The introduced limiting feature "wherein the dehydrating and heat treating steps are conducted under conditions to avoid degradation or hydrolysis of the starch or flour" constitutes a functional feature.

3.2.1 According to T 68/85 (OJ EPO 1987, 228, point 8.4.3 of the reasons), "the effort to define a feature in functional terms must stop short where it jeopardises the clarity of a claim as required by Article 84 EPC. That clarity demands not only that a skilled person be able to understand the teaching of the claim but also that he be able to implement it. In other words, the feature must provide instructions which are sufficiently clear for a skilled person to reduce them to practise without undue burden, if necessary with reasonable experiments."

3.2.2 In paragraph [0020] of the patent in suit, conditions for the dehydration of the starch are mentioned so that inhibition is favoured over hydrolysis or degradation. Such conditions must be distinguished from conditions mentioned in amended Claim 1 where it says that "the dehydrating **and** heat treating steps are conducted under conditions **to avoid degradation or hydrolysis** of the starch or flour". Conditions in which inhibition is favoured means any condition were the degree of inhibition must be higher than the degree of hydrolysis or degradation. Therefore, a condition in which inhibition is favoured over hydrolysis or degradation is not necessarily a condition where degradation or hydrolysis of the starch is avoided. It follows that paragraph [0020] of the patent in suit does not provide sufficient guidance for a person skilled in the art to find the conditions which permit to avoid degradation or hydrolysis of the starch or flour.

Furthermore, paragraph [0020] only mentions conditions applicable to the dehydrating step. However, there is no information whatsoever concerning conditions for the heat treating step. It is a requirement of Claim 1 that both the dehydrating and heat treating step are conducted under conditions to avoid degradation and hydrolysis of the starch or flour. Therefore, a person skilled in the art would not know how to choose the conditions for the heat treating step in such a way as to avoid degradation or hydrolysis of the starch or flour.

3.3 Consequently, Claim 1 does not meet the requirements of Article 84 EPC and the 1st auxiliary request has to be refused.

4. *2nd auxiliary request*

4.1 The claims of the 2nd auxiliary request correspond to the claims of the main request except that at the end of Claims 1 and 8 the following wording has been added:

"… wherein the dehydrating and heat treating steps are conducted by the application of dry heat in air or in an inert gaseous environment".

The limitation introduced into Claims 1 and 8 finds its support in the third paragraph on page 8 of the application as originally filed. Thus, no objection under Article 123(2) or (3) EPC arises.

4.2 However, the wording "dry heat in air" used in the amended claims does not meet the requirements of Article 84 EPC. It is conspicuous to the Board that the patent in suit offers no further definition and/or explanation for the term "dry heat in air" so that a skilled person has to interpret that term. Thus, the term "dry heat in air" could, for example, be interpreted by the skilled person to mean that air is used in process steps (a) and (b) that has no moisture. However, it is not clear how such an interpretation could ever be reconciled with the most preferred embodiment of the patent in suit, namely a process where the dehydrating and the heat treating steps are carried out simultaneously in a fluidized bed reactor or drier which is still an embodiment of the 2nd auxiliary request (Claim 5). In such a process, only at the very beginning would the air have no moisture, but it would accumulate moisture going through the

starch forming the fluidised bed. Hence, a large part of the starch, if not the majority of it, would be dehydrated and heat treated by moist air. Therefore, it is not clear whether such an embodiment is in line with the new limitation in Claims 1 and 8.

Claims 1 and 8 of the 2nd auxiliary request do not, therefore, comply with Article 84 EPC due to the high potential of ambiguous interpretation of the feature "dry heat in air". Consequently, the 2nd auxiliary request is refused.

5. *Admissibility of 3rd to 8th auxiliary requests*

The Board was confronted at the oral proceedings with the filing of new auxiliary requests, ie auxiliary requests 3-8. Appellant Opponent 01 requested that these requests not be admitted into the proceedings.

The necessity further to restrict the claimed subject-matter had become apparent to the Appellant Proprietor only during the discussion of the process claim of the main request (ie Claim 8) which was found to lack novelty over D1. Consequently, there had been no need to discuss the product claim of the main request (Claim 1). The Appellant Proprietor was, however, of the opinion that the subject-matter of Claim 1 which represented only part of the products obtainable by the process of Claim 8 was novel and inventive over D1. Since, furthermore, the claims of the 3rd and 5th auxiliary requests only contained product claims of an auxiliary request of higher rank (ie all process claims had been deleted) and the 4th and 6th-8th auxiliary requests were merely renumbered

versions of previously filed auxiliary requests, the Board was satisfied that the other party could properly deal with the late filed requests. Consequently, the 3rd-8th auxiliary requests were admitted into the proceedings.

6. *3rd auxiliary request*

6.1 Claims 1-7 of the 3rd auxiliary request correspond to Claims 1-7 as granted (point I, above). Thus, no objections under Articles 123 or 84 EPC arise. Nor was any objection raised by Appellant Opponent 01 in this context.

6.2 Novelty (3rd auxiliary request)

As shown in points 2.2 and 2.4, above, D1 discloses a process comprising the step of dehydrating and heat treating a non-pregelatinized granular commercial corn starch which starch was not a waxy starch. On the other hand, the subject-matter of Claim 1 of the 3rd auxiliary request is specified to be a thermally-inhibited, granular **waxy** starch or flour.

The only reference in D1 to the "crosslinking" and thus inhibition of **waxy** starch can be found in the context of Martin's "other (unreported) experiments" (page 1285, last paragraph) form which he tentatively made some further conclusions, *inter alia* "(4) Alkaline roasting crosslinks any type of starch: potato and waxy starch also appeared to crosslink" (page 1286, first paragraph). However, the process conditions of these other experiments are, due to their unreported nature, unknown. Thus, it is not clearly and unambiguously

derivable from D1 which waxy starch was used (was it a non-pregelatinized granular waxy starch?) or whether these other experiments actually corresponded to the experiments leading to samples I_6 and I_8. Hence, novelty of the subject-matter of Claim 1 of the 3rd auxiliary request over the disclosure of D1 has to be acknowledged.

6.3 Inventive step (3rd auxiliary request)

6.3.1 It is an aim of the patent in suit to inhibit native or modified starch so as to perform the same as chemically crosslinked starch but without the use of chemicals (paragraph [0010] of the patent in suit). As pointed out in point 2.2.1, above, D1 discloses "crosslinked" (ie inhibited) starch obtained by alkaline roasting, ie without the use of chemicals. Thus, contrary to the opinion of the Appellant Proprietor, D1 is in the technical field concerned and discloses technical effects most similar to the patent in suit. Since, furthermore, the Board sees no reason to write off D1 as valid prior art (point 2.4, above), D1 is considered, in line with Appellant Opponent 01, to represent the closest prior art.

6.3.2 Taking into account that D1 already discloses inhibited non-waxy starch (samples I_6 and I_8) and no specific technical advantage can be attributed to the fact that a waxy starch is in the claims of the 3rd auxiliary request, the objective technical problem can only be seen in the provision of an alternative to the inhibited starch disclosed in D1.

6.3.3 The person skilled in the art confronted with this objective technical problem finds in the first paragraph of page 1286 of D1 the statement that "Alkaline roasting crosslinks any type of starch: potato and waxy starch also appeared to crosslink". Thus, the alternative defined in Claim 1 of the 3rd auxiliary request is already suggested by D1 itself. Consequently, the subject-matter of Claim 1 of the 3rd auxiliary request is obvious from D1 alone.

At the oral proceedings, the Appellant Proprietor argued that the hint in D1 was nothing more than an invitation to the skilled person to start a research program. Furthermore, the skilled person would know from D10 that waxy and non-waxy starch performed differently. This line of argumentation is, however, not convincing. Firstly, the explicit reference in D1 to waxy starch is a clear incentive for the person skilled in the art going into this direction. Secondly, as pointed out in the decision under appeal in point 6.3.2.2.4, D10 uses a completely different technology, namely the inhibition of starch suspensions in an aqueous medium. Thus, no conclusion can be drawn from D10 which would dissuade the skilled person to follow the direction suggested in D1.

7. *4th auxiliary request*

7.1 Amendments (4th auxiliary request)

7.1.1 Claims 1 and 8 of the 4th auxiliary request (point XIV(vii), above) differ from Claims 1 and 8 as granted in that the following wording has been added at the end of the claims:

"…, wherein the dehydrating and heating steps are conducted in a fluidized bed reactor or drier."

This amendment is based on the passage at page 8, last paragraph of the application as originally filed where it is stated that the dehydrating and heat treating apparatus can be *inter alia* "fluidized bed reactors and driers". The wording used in Claims 1 and 8 ("conducted in a fluidized bed reactor or drier") is considered to be equivalent to the wording in that passage. Thus, the amendment meets the requirements of Articles 123(2) EPC.

Neither does the amendment extend the protection conferred, so that Claims 1 and 8 of the main request meet the requirements of Article 123(3) EPC, too.

7.1.2 Appellant Opponent 01 submitted that the words "a fluidized bed reactor or drier" were not sufficiently clear in meaning to meet the requirements of Article 84 EPC. "A fluidized bed reactor or drier" might mean a choice of either a fluidized bed reactor or a fluidized bed drier, or, on the other hand, a fluidized bed reactor or a drier per se (ie any drier).

However, the use of only one indefinite article in the expression "a fluidized bed reactor or drier" is, in the Boards view, a clear indication that the term "fluidized bed" is a qualification which applies to both "reactor" and "drier". This view is supported by the passage on page 8 of the application as originally filed where dehydrating and heat treating apparatus are listed. In this list, the words "fluidized bed reactors

and driers" are set between commas. The punctuation makes it plain that the term "fluidized bed" applies to the whole section of this part of the list.

Thus, the amendment "fluidized bed reactor or drier" in Claims 1 and 8 in the 4th auxiliary request is not objectionable under Article 84 EPC.

7.1.3 In dependent Claims 3, 4, 10 and 11 of the 4th auxiliary request (point XIV(vii), above) the references to the heating temperature and the heating time have been deleted. Appellant Opponent 01 objected to amended Claims 3 and 4 of the main request under Rule 57a EPC because the amendment was not necessitated by any ground of opposition. However, the Board cannot concur with this view for the following reasons:

Dependent Claims 3, 4, 10 and 11 as granted (point I, above) specify a set of process conditions of the process described in the independent claims, namely the pH, the heating temperature and the heating time. Since, however, these process conditions are not disclosed in the application as originally filed in combination with a fluidized bed reactor or drier as such, ie the feature incorporated into Claims 1 and 8 of the 4th auxiliary request, Claims 3, 4, 10 and 11 as granted could not be retained in the 4th auxiliary request unchanged in view of Article 123(2) EPC. The avoidance of an objection under Article 123(2) EPC is clearly in line with Rule 57a EPC which stipulates that "… the description, claims and drawings may be amended, provided that the amendments are occasioned by grounds for opposition specified in Article 100, even if the respective ground has not been invoked by the

opponent". Consequently, the objection of Appellant Opponent 01 under Rule 57a EPC against Claims 3, 4, 10 and 11 of the main request must fail.

Further, the amendment of Claims 3, 4, 10 and 11 of the 4th auxiliary request meets the requirements of Article 123(2) EPC because the application as originally filed contains at page 5, last paragraph a general reference to the preferred pH values indicated in dependent Claims 3, 4, 10 and 11. This passage applies to all originally disclosed processes, ie also a process using a fluidized bed reactor or drier.

7.1.4 In summary, the amendments to Claims 1, 3, 4, 8, 10 and 11 of the 4th auxiliary request are allowable.

7.1.5 Finally, dependent Claims 2, 5-7, 9, and 12-16 are based on Claims 2, 5-7, 9, 12 and 14-17 as granted, whereby Claim 15 correctly refers to the process of the previous claim and not, as corresponding Claim 16 as granted, to the starch of the previous claim (in this context see also point 2.1, above).

7.2 Novelty (4th auxiliary request)

D1 is still the only relevant document with respect to novelty.

7.2.1 The process of Claim 8 of the 4th auxiliary request requires that the dehydrating and heating steps are conducted in a fluidized bed reactor or drier. D1 does not disclose the use of a fluidized bed reactor or drier so that the process of Claim 8 of the 4th auxiliary request is novel over D1.

As regards novelty of the subject-matter of Claim 1 of the 4th auxiliary request, it has already been shown that the subject-matter of Claim 1 as granted is novel over D1 (point 6.2, above). Since the thermally-inhibited, non-pregelatinized granular waxy starch of Claim 1 of the 4th auxiliary request is even further limited by the product-by-process feature that the dehydrating and heating steps are conducted in a fluidized bed reactor or drier, the subject-matter of Claim 1 of the 4th auxiliary request must also be novel over D1.

7.2.2 Summing up, the subject-matter of Claims 1 and 8 of the 4th auxiliary request and, by the same token, the subject-matter of dependent Claims 2-7 and 9-16 is novel over D1.

7.3 Problem and solution (4th auxiliary request)

7.3.1 D1 is still considered to be the closest prior art for the subject-matter of the 4th auxiliary request. The reasons given in point 6.3.1, above, apply equally to the amended subject-matter of this request. In contrast to the process disclosed in D1, the process required in the claims of the 4th auxiliary request does not use a forced-air oven for the dehydrating and the heating but a fluidized bed reactor or drier.

7.3.2 It is conspicuous to the Board that paragraph [0035] of the patent in suit states that "superior thermally inhibited starches having high viscosities with no or low percentage breakdown in viscosity are obtained in shorter times in the fluidized bed reactor than can be

achieved using other conventional heating ovens." This statement in the patent in suit is a first indication that the dehydrating and heat treating apparatus has an influence on the product.

Furthermore, the Appellant Proprietor has submitted additional experimental data, ie D28, where samples (waxy corn starch as base material) both with the oven method of D1 and a fluid bed dryer have been prepared. The oven method followed the procedure provided in D1 and the fluid bed method was performed using the processing parameters of D1 adapted to the fluid bed dryer. These data demonstrate that the products prepared by the fluidized bed method differ from those prepared by the oven method according to D1. As can be seen from Figure 1 of D28 which displays the viscosity profiles of the oven and fluidized bed products performed under the teachings in Dl, all four products gave a peak viscosity followed by a substantial decrease in viscosity or breakdown. Neither the oven nor fluid bed method of alkaline roasting waxy corn starch according to D1 will result in a viscosity profile with "no fall" or no breakdown (levelling-off). However, the products prepared by the fluid bed method clearly differ from those prepared by the oven method. In the amylograph profiles in Figure 1, the base starch peaks and shows breakdown prior to reaching 95°C. The same is true for the oven method products. However, products prepared by the fluid bed method did not show a decrease in viscosity as they increased to 95°C. Once held at 95°C for one hour, both of the products derived from the fluid bed method ($I_{6\ fbr}$ and $I_{8\ fbr}$) undergo far less breakdown than the products derived from the oven method ($I_{6\ oven}$ and $I_{8\ oven}$) and the base starch. The base

starch shows near complete breakdown. The $I_{6\ oven}$ product breaks down comparable to the base having viscosity of less than 100 BU. The $I_{8\ oven}$ product, despite showing breakdown during the cooking stage, doesn't breakdown as much as the base. Both of the fluid bed products, $I_{6\ fbr}$ and $I_{8\ fbr}$, show significantly less breakdown. Evidently, the products bear a "fingerprint" of the specific process used to produce them. The use of the fluidized bed reactor or drier results in a different, in fact improved viscosity behaviour when compared with the products of D1 which were prepared in a forced-air oven.

On the other hand, Appellant Opponent 01 has provided no evidence for its allegation that the apparatus itself does not confer a specific physical or chemical property on the starch or flour. Moreover, the results of the Appellant Proprietor appear plausible when taking into account general technical considerations. A fluidized bed reactor or drier has the ability to remove moisture quickly and efficiently and has a high heat transfer rate. This means that there is, for example, less contact between starch and moisture leading to less undesirable side reactions and, therefore, a different product.

7.3.3 Thus, contrary to the opinion of Appellant Opponent 01 the objective technical problem with respect to the closest prior art does not lie solely in the provision of a more efficient process for producing thermally-inhibited starch or flour. Rather, the objective problem has to be seen in the provision of improved thermally-inhibited starch or flour, in particular with respect to its viscosity behaviour.

The data in D28, which provide a comparison with the closest prior art as fair as could be, show that the above defined objective technical problem is solved for waxy corn starch. However, the Board is satisfied that the objective technical problem is also solved by the more general process of Claim 8 for the following reasons. Firstly, the statement in paragraph [0035] of the patent in suit promises the advantage associated with the use of a fluidized bed reactor or drier for all types of starch. Secondly, Appellant Opponent 01 has provided no evidence whatsoever which could give rise to any doubt that the objective technical problem is not solved over the whole scope of Claim 8.

7.4 Inventive step (4th auxiliary request)

7.4.1 It remains to be decided whether the proposed solution, ie treating a non-pregelatinized granular starch or flour under the conditions set out in Claim 8 of the 4th auxiliary request, is obvious from the available prior art.

7.4.2 Appellant Opponent 01 basically relied upon a combination of D1 with D12, D13, D15, D26 or D27.

D1 does not suggest to use a fluidized bed reactor or drier for drying and heat treating the starch. Although D12, D13, D15, D26 and D27 mention a fluidized bed reactor in the context of processing starch, none of these documents mentions or suggests that a starch would exhibit superior properties when a fluidized bed reactor or drier is used in the dehydration and heating step as set out in Claim 8 of the 4th auxiliary request.

It is therefore hard to see why a person skilled in the art, faced with the problem of providing a starch with improved properties, would try to modify the closest prior art by replacing the forced-air oven of D1 with the fluidized bed reactor mentioned in those documents. Moreover, it appears that a combination of D1 with these documents is based on hindsight. Without the knowledge of the patent in suit a person skilled in the art had no incentive whatsoever to consider a fluidized bed reactor or drier as mentioned in D12, D13, D15, D26 or D27 as an appropriate solution to the posed problem. Consequently, the subject-matter of the 4th auxiliary request is not obvious from the cited prior art.

7.4.3 Appellant Opponent 01 argued that the problem to be solved by the claimed subject-matter had to be seen only in the reduction of the drying time as mentioned in paragraph [0035] of the patent in suit. It would have been obvious for a person skilled in the art to substitute the less effective forced-air oven of D1 with the fluidized bed reactor of D3 having high heat transfer characteristics. The provision of a starch with an improved property was merely a bonus effect.

However, this line of argumentation is not convincing for the following reasons. Firstly, it ignores that the patent in suit itself refers to superior thermally-inhibited starches (paragraph [0035]). Secondly, when defining the objective technical problem, all technical effects foreshadowed by the application as originally filed have to be taken into account. In its approach, the Appellant Proprietor omits a key element achieved by the claimed subject-matter, namely the improved

viscosity behaviour of the thermally-inhibited starch. Hence, this approach must fail.

7.4.4 In summary, the subject-matter of Claims 1 and 8 of the 4th auxiliary request, and, by the same token, the subject-matter of dependent Claims 2-7 and 9-16 is based on an inventive step.

8. *Description (4th auxiliary request)*

At the oral proceedings, the Appellant Proprietor filed amended pages of the patent specification in order to bring the patent specification in line with the claims of the 4th auxiliary request. Appellant Opponent 01 raised no objections against the amended patent specification nor saw the Board any reason to raise an objection on its own.

9. Since the 4th auxiliary request of the Appellant Proprietor is allowable, any discussion of the further auxiliary requests is superfluous.

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 as amended in the following version:

   Description:
   Pages 5, 7, 8, 11, 13 to 21 of the patent specification
   Pages 2 to 4, 6, 9, 10, 12, 22, and 23 filed during the oral proceedings of 13 November 2007

   Claims:
   No. 1 to 16 of the 4th auxiliary request filed during the oral proceedings of 13 November 2007.

The Registrar: The Chairman:

E. Görgmaier C. Idez