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Datasheet for the decision of 6 October 2010

Case Number: T 0398/08 - 3.3.03

Application Number: 01120646.3

Publication Number: 1159880

IPC: A23L 1/0522

Language of the proceedings: EN

Title of invention:
A food containing a thermally-inhibited pregelatinized non-granular starch or flour

Patentee:
BRUNOB II B.V.

Opponent:
Cerestar Holding B.V.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Novelty (main request): yes, product-by-product"
"Inventive step (main request): yes, non-obvious combination"

Decisions cited:
-

Catchword:
-

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Case Number: T 0398/08 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 6 October 2010

Appellant: (Patent Proprietor)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 4 December 2007 and posted 21 December 2007 revoking European patent No. 1159880 pursuant to Article 102(1) EPC 1973.**

Composition of the Board:

Chairman: R. Young
Members: O. Dury
C. Vallet

Summary of Facts and Submissions

I. The mention of the grant of European patent No. EP 1 159 880 B1, based on application 01120646.3, filed on 16 May 1996 as a divisional application of the parent application 96920247.2, in the name of National Starch and Chemical Investment Holding Corporation and further transferred to Brunob II B.V. was published on 27 October 2004 in Bulletin 2004/44.

II. In the present decision, any reference to passages in the patent in suit as granted will be given underlined in squared brackets, e.g. [claim 1].

III. The granted patent was based on [12 claims], wherein the sole independent claim read as follows:

"1. A food containing a starch or flour which has been prepared by a process, which comprises the steps of: pregelatinizing a starch or flour using a process which disrupts the granular structure, and thermally inhibiting the starch or flour by dehydrating, thermally or non-thermally, the starch or flour to anhydrous or substantially anhydrous and heat treating the dehydrated starch or flour for a time and at a temperature sufficient to thermally inhibit the starch or flour."

[Claims 2-12] were dependent claims directed to elaborations of the process of [claim 1].

IV. Notice of opposition against the patent was filed by Cerestar Holding B.V. on 8 July 2005 on the grounds of Art. 100(a) EPC (lack of novelty; lack of inventive

step). The opposition was substantiated on the following documents:

D1: EP 0 108 833 B1

D2: WO 95/04082

D3: Crosslinking of Starch by Alkaline Roasting, J. Appl. Pol. Science, 1967, Vol. 11, pages 1283-1288

D4: US-A-5 131 953

D5: US-A-4 477 480

Regarding novelty, the objection was raised that the subject matter of the granted patent was anticipated by **D1**.

V. During the oral proceedings held before the opposition division on 4 December 2007, the issue of novelty with regard to **D2**, in particular the combination of examples 7 and 5, was addressed for the first time by the opposition division. No objection was raised in this regard by the parties.

VI. In its decision announced at the end of the oral proceedings and issued in writing on 21 December 2007 the opposition division revoked the patent because neither the main request, nor auxiliary request 1, nor auxiliary request 2 was novel over **D1** and/or **D2**.

The opposition division in particular decided that the food products claimed in each of the requests of the patent proprietor were anticipated by

- those comprising a starch prepared according to the teaching of example 1 of **D1**;
- those comprising a starch disclosed by the combination of examples 7 and 5 of **D2**.

VII. Notice of appeal against the decision of the opposition division was filed on 15 February 2008 by the patent proprietor with simultaneous payment of the prescribed fee. In its statement of grounds of appeal filed on 21 April 2008, the patent proprietor, now appellant, requested that the contested decision be set aside and the patent be maintained unamended or, alternatively, in its amended form according to any of auxiliary requests 1-3 filed therewith.

The appellant further filed the following documents:

D12: Statutory declaration of Karen G. Kaiser and James P. Zallie, dated 18 October 2007;

D13: First declaration of Mr Kasica: comparative experiments related to **D1**;

D14: Second declaration of Mr Kasica: comparative experiments related to example I of **D2**.

The arguments of the appellant in order to demonstrate novelty of the subject matter claimed over **D1** and **D2** were as follows:

– The starches prepared in **D1** were not thermally inhibited in the sense of the patent in suit because **D1** failed to disclose that starch was dehydrated to a moisture content of 1 % by weight or less as required by the process defined in [claim 1]. The appellant showed with **D13** that such a moisture content was not obtained in example 1 of **D1** and argued that the same held true for example 2 of **D1**. Accordingly, the starches prepared in **D1** differed from those defined in claim 1, with the consequence that the food products of **D1** did not anticipate the subject matter of [claim 1];

- The combination of example 7 and example 2 of **D2**, which formed the basis of the objection of lack of novelty of the opposition division, was not expressly disclosed in **D2**;
- The starch defined in [claim 1] differed from those of **D2** in that they were pregelatinised, i.e. non-granular contrary to those of **D2** which maintained their granular structure. **D14** showed that food prepared using non-granular starch according to the invention exhibited superior properties than similar food prepared using granular starch according to the teaching of **D2**. In particular, retorted white sauces had improved viscosity after retorting and showed less lipid (margarine) separation. These differences in properties showed that the food products *per se* were different.

The appellant further submitted that the subject matter claimed was inventive over **D1**, **D2** and/or the combination of **D1** and **D2** for the following reasons:

- The problem solved by the patent in suit was to provide chemically unmodified (i.e. so-called "clean labelled") pregelatinised non-granular starches which had the textural properties of chemically crosslinked pregelatinised non-granular starches, which were suitably used in food products and which showed superior properties in terms of viscosity and organoleptic properties;
- **D1** did not provide a thermally inhibited starch in the sense of the patent in suit;
- It was established in the art that granular and non-granular starches were structurally different products having significantly different properties and functions. Hence, the combination of **D1**, which

concerned non-granular starches, and **D2**, which was directed to granular starches, would not have been considered by the skilled person and was, thus, not obvious.

Therefore, the appellant was of the opinion that an inventive merit should be acknowledged since the skilled person would have had no incentive to combine the teachings of **D1** and **D2**.

VIII. In its reply to the statement of grounds of appeal received on 18 September 2008, the opponent, now respondent, requested that the appeal be dismissed and the patent be revoked in its entirety.

Concerning novelty, the respondent raised the following objections:

- **D1** disclosed pregelatinised starches which were further submitted to a heat treatment, the latter being identical to those indicated in the patent in suit as suitable to prepare thermally inhibited starches as defined in [claim 1]. In particular the starches prepared in example I, example II, and example I-J-4 given in Table 1 of **D1** were identical to those prepared in the contested patent. Hence, the food products of **D1** comprising such starches anticipated the subject matter of [claim 1];
- **D2** disclosed thermally inhibited starches for food products, which were dehydrated to a moisture content of 5 % or less, most preferably 1 % or less, and then further submitted to a heat treatment. **D2** further taught that said starches were gelatinised in an aqueous medium in which it was dispersed. The respondent argued that the patent proprietor, now appellant, had admitted during the oral proceedings

before the opposition division that food compositions comprising such starches were no different from food compositions according to the patent in suit. Hence, novelty should be denied.

Regarding the inventive step, the respondent raised the following objections:

- Should novelty over **D1** be acknowledged, the processes claimed only differed from **D1** as closest prior art in that the starch should be specifically dehydrated to a moisture content of 1 % by weight or less. This solution was, however, already known from **D2**. Although it was admitted that **D1** and **D2** related to non-granular and granular starches, respectively, the respondent argued that the heat treatment conditions employed in both documents were generally the same and were carried out for the same purpose thus rendering the combination of these documents obvious;
- The fact that starches having a basic pH could be thermally inhibited by heat treatment was also known from **D3**. Hence, the combination of **D1** and **D3** would obviously lead to the subject matter claimed;
- It was further apparent that the heat treatments taught in either **D2** or **D3** could be carried out on any pregelatinised starch. The invention claimed was, thus, obvious from the combination of either **D2** or **D3** with any of the prior art dealing with pregelatinised starch e.g. cited on page 4 of the patent in suit;
- Same was true regarding the combination of either **D2** or **D3** with **D4** which also disclosed pregelatinised starches;

– **D5** disclosed a process for removing the off-taste in cereal starches and comprising a washing step followed by a pregelatinisation. In addition, **D5** taught that the starch so prepared could be further modified by any conventional physical or chemical means and this, before or after the off-flavours treatment. The combination of **D5** and **D3** would, thus, obviously lead to the subject matter of the patent in suit.

IX. In its submission of 2 February 2009, the appellant repeated its conclusions regarding novelty already laid down in its statement of grounds of appeal. The following arguments were further brought forward:

– The allegation of the respondent that the appellant had admitted that food compositions containing starch prepared according to **D2** were no different from food compositions according to the patent in suit was strongly contested;

– **D1** was not a suitable closest prior art since it did not deal with the problem addressed by the patent in suit;

– None of the combinations contemplated by the respondent in order to deny the inventive merit was obvious. In particular, the skilled person would have had no incentive to combine the teaching of prior art dealing with granular starches (**D2**, **D3**) with that of prior art dealing with non-granular starches (**D1**, **D4**, **D5**). The appellant concluded that the combinations contemplated by the opponent/respondent represented an *ex post facto* analysis having in mind the teaching of the patent in suit (hindsight).

X. On 2 July 2010 the board issued a summons to attend oral proceedings and informed the parties of its provisional opinion.

Regarding novelty, the following points were *inter alia* mentioned by the board:

- **D1** did not explicitly disclose a dehydration step and/or thermally inhibited/crosslinked starch as defined in the [claims]. The respondent had, however rendered plausible with its comparative data **D13** that examples I and III of **D1** did not disclose that starch was dehydrated to 1 % or less moisture by weight in the sense of paragraph [0011]. It would have to be clarified, however, during the oral proceedings whether the same conclusions were to be drawn regarding examples II, IV and V of **D1**. In this respect, it was conspicuous that the examples of the contested patent had been performed "using a conventional oven or a dextriniser" (see paragraph [0048]), using very similar conditions of pH, temperature, and duration of heating than in example II of **D1**;
- The by-process element of [claim 1], which represented the distinguishing feature over the food products of **D2**, was the pregelatinisation step, optionally in combination with the dehydration of starch to less than 1 % moisture by weight, which was not mandatory in **D2**. Novelty could, however, only be acknowledged if the appellant demonstrated that this/these modification(s) of the process indeed resulted in different products *per se*;
- It was not clear whether or not the starches prepared in the examples of **D2** were dehydrated as those defined in [claim 1]. Hence, it was neither

clear whether or not the dehydration step of starch to - substantially - anhydrous represented a distinguishing feature of the processes used, nor if such a dehydration step could confer novelty to the products claimed;

- In order to demonstrate novelty, the appellant had shown in **D14** that retorted white sauces prepared with an additional pregelatinisation step exhibited better properties than those prepared according to **D2** without said pregelatinisation. This could be considered as evidence that, these properties being different, both products were indeed different *per se*. It would, however, remain to be clarified whether or not the products claimed, which were not restricted to any specific degree of inhibition, were also "obtainable" by a process according to **D2** using specific conditions of e.g. moisture content, pH, heating time or temperature, which were all taught to have an impact on the dehydration process (see page 11 of **D2**);
- Besides, should it be shown that the starches of **D2** were effectively inhibited as in the patent in suit, it would still have to be clarified whether or not the fact that a pregelatinisation step was performed was still recognisable in the final product, i.e. in the food product in its gelled state.

The board further informed the parties that the inventive merit would be assessed according to the problem-solution approach.

XI. In its rejoinder filed on 6 September 2010, the respondent submitted the following additional arguments to deny novelty over both **D1** and **D2**:

- Although **D1** did not explicitly disclose the dehydration step defined in [claim 1], the experimental conditions used in examples I and II were so similar to those used e.g. in [example 1] that the starch of example I of **D1** must also have been inhibited to some degree, as in [example 1]. The same held true regarding the starch prepared in examples II-III of **D1** and those used in the preparation of a food product according to example X of **D1;**
- The subject matter claimed, namely a food composition comprising a pregelatinised, thermally inhibited starch, was not to be distinguished from a food composition containing thermally inhibited starch in a gelatinised state according to the teaching of **D2**, in particular its example 7.

The respondent further considered that the subject matter claimed was not inventive because it was obviously derivable from the combination of the teachings of the closest prior art **D2** with **D1**.

XII. In its submission of 6 September 2010 the appellant filed new auxiliary requests 1-4 in replacement of former auxiliary requests 1-4.

In addition, the respondent further filed additional comparative data in order to demonstrate that the starches prepared according to examples II and V of **D1** were not inhibited in the sense of [claim 1] because they had not mandatorily been dehydrated to a moisture content of 1 % by weight or less. These data will be referred to as:

D15: Declaration of Mr Kasica: comparative experiments related to examples II and V of **D1**.

XIII. Oral proceedings were held on 6 October 2010 in the presence of both parties.

Initial requests

The **appellant** (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained in unamended form or, alternatively, that the patent be maintained on the basis of auxiliary requests 1 to 4 filed with letter of 6 September 2010.

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

The following issues were addressed during the oral proceedings:

Novelty over D1

XIV. The appellant explained as background information that there were three different ways of inhibiting starch, namely:

- by chemical modification, which was the solution from which the patent in suit wanted to go away;
- by heat treatment but without heating up to the point where starch was - substantially - anhydrous, which was, in the appellant's view, the teaching of the prior art;
- by heat treatment so as dehydrate starch to a - substantially - anhydrous state i.e. a moisture

content of 1 % by weight or less, which was the object of the contested patent.

The appellant considered that **D1** belonged to the second category of processes as above identified. **D1** in particular failed to explicitly disclose a heat treatment of starch up to a moisture content of 1 % by weight or less. In addition, as shown by the appellant with its comparative data **D13** and **D15**, **D1** did not disclose either implicitly or explicitly a thermal inhibition in the sense of the granted patent. The respondent had, thus, failed to demonstrate that the processes disclosed in **D1**, in particular in any of its examples, inevitably comprised and/or implicitly disclosed a thermal inhibition step as defined in [claim 1]. As a consequence, the respondent had not discharged its burden of proof in order to demonstrate that **D1** disclosed starches which were thermally inhibited in the sense of [claim 1].
The appellant further submitted that **D13** showed that this difference between the processes of **D1** and those defined in [claim 1] would be noticeable in the starch so prepared, the starches being indeed characterised by their preparation process. This was demonstrated e.g. by the significant increase in viscosity shown by the data of Table 1 of **D13**. As a further consequence, the food products claimed were also to be distinguished from those prepared in **D1**.

The respondent submitted that **D1** dealt, like the patent in suit, with instant gelling, non-chemically modified starches usable in food and prepared by a process comprising a pregelatinisation step followed by a heat treatment. The respondent further pointed out that the

experimental conditions used for the heat treatment in example I-F-3 of **D1** were identical to the most preferred conditions taught in paragraph [0033] as being suitable for thermally inhibiting starch. Similar conditions had also been used in **D15**. The respondent, thus, concluded that **D1** disclosed the same steps of pregelatinisation and thermal inhibition of starch as defined in [claim 1]. Consequently, although it admitted that **D1** did not explicitly disclose that starch was dehydrated to less than 1 % by weight, the respondent concluded that the starch disclosed in **D1**, in particular in its examples, were identical to those defined in [claim 1]. Hence, the food products containing starch as claimed in the patent in suit were anticipated by those of **D1** comprising a starch prepared according to the teaching of **D1**.

The respondent further contested that **D13** and **D15** were fair repetition of the teaching of **D1**, in particular its examples I and II. Hence, **D13** and **D15** did not represent a faithful reproduction of **D1** and did not allow to draw the conclusion that **D1** did not disclose that starch was dehydrated to a moisture content of 1 % or less, as alleged by the appellant.

Novelty over D2

XV. The appellant explained that **D2** dealt with granular starches and failed to disclose that starches were pregelatinised. Besides, **D2** only disclosed a dehydration of starch to a moisture content of 1 % by weight or less as an optional feature. Hence, the starches prepared in **D2** were different from those prepared in the patent in suit. As a consequence, the

food products disclosed in **D2** did not anticipate the subject matter claimed.

The appellant contested in particular that the food products obtained e.g. from the pasteurisation of starch prepared according to **D2**, as taught e.g. on page 12 of **D2**, would fall under the scope of [claim 1].

The appellant further disagreed with the argument of the respondent that the gelatinisation of starch prepared in **D2** would lead to a complete disruption of the starch granules as obtained by a pregelatinisation treatment.

The appellant further argued that **D14** showed that white sauces prepared according to the patent in suit exhibited improved properties as compared to white sauces according to the teaching of **D2**. These data were evidence that the food products disclosed in **D2** did not anticipate the subject matter of [claim 1].

XVI. Questioned by the Chairman of the board, the appellant confirmed that the starch prepared in **D14** to illustrate either the teaching of the invention or that of **D2**, had both been dehydrated so as to exhibit a moisture content of 1 % by weight or less as required by [claim 1].

XVII. The respondent argued that **D2** disclosed e.g. in Table 1, Sample 4 (waxy maize at pH 8.2, treated at 160°C for 4 hours) or in Table 2, Sample 4 (waxy maize at pH 8.2, treated at 160°C for 4 hours), food compositions having the similar viscosity properties and similar texture (slightly cohesive) than those reported in the patent

in suit (page 8, line 10: waxy maize at pH=8, treated at 140°C for 4 hours). Such products were, thus, bound to anticipate the subject matter claimed.

The respondent in particular argued that the gelatinisation of the starches prepared according to the teaching of **D2**, in particular following a heat treatment at 90°C, would lead to the complete disruption of the granules: hence, the food products disclosed in **D2** took away the novelty of the subject matter of [claim 1].

XVIII. After deliberation the Chairman of the board announced that the subject matter of the main request was novel.

Inventive step starting from D2 as closest prior art

XIX. Following the problem-solution approach, the appellant considered **D2**, which deals with the same problem as the patent in suit, as closest prior art. In the appellant's view, **D1** would be a less promising starting point, in particular because it did not teach to go to anhydrous starch.

The technical problem solved was identified as being the provision of a non-granular starch and food product containing said starch, having improved viscosity and reduced margarine separation independently of whether or not the product was retorted, as compared to **D2**.

The solution of said problem was to use in the food a starch which had been both thermally inhibited and pregelatinised.

The appellant submitted that the subject matter claimed was inventive because none of the cited document would have motivated the skilled person to pregelatinise the starches of **D2** in order to increase the viscosity and reduce the margarine separation of food products containing such starches.

Regarding the alleged obviousness of the combination of the teaching of the prior art documents made by the respondent, the appellant submitted the following arguments:

- **D2** nowhere mentioned a process involving pregelatinising the starches prepared therein: the sole reference to pregelatinised starches was on page 12, lines 6-11 of **D2** but it only concerned the optional use of pregelatinised starches as additional component to be blended with starches inhibited according to the teaching of **D2**;
- The combination of **D2** and **D1**, which was contemplated by the respondent, was not obvious, mainly because these two documents were directed to starches having significantly different structures, properties and functions. Whereas **D2** concerned preparing granular starches which were crystalline, insoluble, non functional, non homogeneous and needed cooking when used, **D1** dealt with non-granular starches which were amorphous, soluble, functional, homogeneous and did not need cooking. Hence, the skilled person starting from **D2** would have had no good reason, without knowing the subject matter claimed in the patent in suit, to consider **D1** (could/would approach; hindsight).

XX. The respondent first contemplated to raise for the first time an objection of lack of inventive step based on the combination of the teachings of **D2** and **D10** ("Handbook of Water-Soluble Gums and Resins", Edited by Robert L. Davidson, 1980, Chapter 22, Starch and its Modifications).

The appellant, however, resisted this new objection being made because **D10** was not part of the appeal proceedings.

The Chairman of the board confirmed that **D10** had only been cited in the opposition proceedings and did not form part of the appeal. The respondent did not pursue this objection further.

XXI. The respondent, then, submitted that the subject matter claimed lacked an inventive merit and agreed that **D2** represented the closest prior art. The objections of the respondent were as follows:

- It was obvious to go from granular starch, according to **D2**, to non-granular starch as claimed in the patent in suit, since this represented the most common modification in order to vary the properties of starch e.g. to increase viscosity: it was well known that disrupting the granules would lead to increased viscosity;
- According to the teaching of **D2**, the starches prepared therein were gelatinised and led to products having "slightly cohesive" or "non cohesive" properties. The patent merely pushed the disruption of the starch granules a bit further than in **D2** and, thus, merely represented a little modification of the prior art, which was obvious;

– In the respondent's view, it was derivable from the data reported e.g. in Table II of **D2** that increasing the duration of the heating led to starches exhibiting non cohesive properties. Hence, the skilled person aiming at increasing the viscosity properties of the starches of **D2** would be prompted to increase the duration of the heat treatment, thus, achieving a thermal inhibition of the starch as defined in [claim 1].

XXII. Questioned by the Chairman of the board, the respondent declared that it had no further line of argumentation to be followed.

Final requests

The **appellant** (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained in unamended form or, alternatively, that the patent be maintained on the basis of auxiliary requests 1 to 4 filed with letter of 6 September 2010.

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

XXIII. The board announced its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Novelty: Art. 54 EPC

2.1 Subject matter claimed in the patent in suit

[Claim 1] deals with a food containing a starch or flour which has been prepared by a process, which comprises the steps of:

- A) pregelatinising a starch or a flour using a process which disrupts the granular structure; and
- B) thermally inhibiting the starch or flour by
  - B1) dehydrating, thermally or non-thermally, the starch or a flour to anhydrous or substantially anhydrous and
  - B2) heat treating the dehydrated starch or flour for a time and at a temperature sufficient to thermally inhibit the starch or flour.

Any reference to steps A and/or B given in the present decision refers back to the steps of pregelatinisation and thermal inhibition, respectively, hereby identified.

According to the wording of [claim 1], steps A and B may be performed in any sequence (see also paragraph [0010]). In the following, any reference to a specific sequence in which the steps are performed will be given using "→" e.g. A→B indicating that step A is done first, followed by step B. Besides, steps B1 and B2 may be accomplished in a single apparatus (e.g. conventional ovens, dextrinisers, microwave ovens, fluidised bed reactors and driers), optionally in a continuous manner (see paragraph [0042] and the [examples]).

2.2 Starch defined as a "product-by-process"

The food according to [claim 1] comprises a starch or flour which is itself defined using a "product-by-process" formulation. The subject matter claimed is, however, directed to the product ***per se***, namely a food comprising a starch or flour, which is ***obtainable by*** a process as recited in [claim 1]. The board, thus, considers that in order to decide whether or not the food products disclosed in **D1** or **D2**, which were cited as novelty destroying for the subject matter claimed, effectively anticipate the subject matter of [claim 1], it has to be decided whether or not the food products comprising a starch as claimed and those disclosed in the prior art are effectively characterised by the starch used in their preparation. In order to do so, it has to be assessed first whether or not the starches disclosed in the prior art are "obtainable" by a process defined in [claim 1].

2.3 Document **D1**

2.3.1 Starches disclosed in **D1**

D1 deals with the preparation of instant starches for food applications and which are prepared without conversion or chemical modification (**D1**: page 1, lines 3-5, 40-42 and 61-65). It discloses a process wherein a native tapioca or potato starch is pregelatinised and then submitted to a heat treatment at 125-180°C for 1.5 to 24 hours (**D1**: claim 1; examples). These processes are illustrated in examples I-V, which make use of various heat treatments of the starches, e.g. in a forced-air oven (examples I and

III), in a dextriniser (example II) or in a microwave oven (example V).
Food compositions comprising such starches are either disclosed in claim 7 or in examples VIII-X.

It was admitted by the respondent that **D1** does not ***explicitly*** disclose, in particular in its examples I-V, a step of thermal inhibition comprising dehydrating starch to anhydrous or substantially anhydrous i.e. to a moisture content of 1 % by weight or less as defined in [claim 1] together with paragraph [0011].
It was, however, disputed by the parties whether or not the heat treatment done in each of examples I-V of **D1** corresponded to a thermal inhibition as defined in [claim 1] i.e. whether or not this step would be ***implicitly*** disclosed in the examples of **D1**, with the consequence that the starches would fulfil the requirements recited in [claim 1].

In this respect, the board points out that it had made it clear in its communication sent as an annex to the summons to the oral proceedings that this precise issue was at stake in the appeal proceedings and that it would have to be clarified during the oral proceedings before the board. However, the respondent has never provided any evidence, even in reaction to the communication of the board, to show that this requirement of [claim 1] was, indeed, inevitably met in any of the processes disclosed in **D1**, in particular in its examples I-V. The board agrees with the appellant that in the absence of any evidence in this regard, the respondent has failed to discharge its burden of proof.

The board further considers that **D1** does not disclose that it was the intention of its inventors to fulfil the precondition for inhibition of starch defined in [claim 1], namely to prepare a starch having a moisture content of 1 % by weight or less. **D1** in particular does not disclose any hint that it aimed at achieving, for any reason, a dehydration of starch at such a low moisture level. There is, thus, no reason to expect that this feature was bound to be achieved or to be implicitly met, in particular in any of examples I-V of **D1**.

The board also agrees with the appellant that, although the appellant did not have the burden of proof, it has nevertheless rendered it plausible on the basis of the comparative data filed in **D13** and **D15**, that **D1** did not disclose that starch was inevitably dehydrated to less than 1 % moisture by weight in the sense of the patent in suit. The board is in particular satisfied that the experiments presented in **D13** and **D15** represent a fair repetition of the teaching of **D1** and considers that the following conclusions may be drawn from these data:

- The appellant has rendered it plausible with **D13** that the heat treatment made by placing pregelatinised starch in a "wide mouthed glass jar" "in a forced air electric oven" according to the information derivable from examples I and III of **D1** did not obligatorily lead to a moisture content of 1 % by weight or less;
- The appellant has also demonstrated in **D15** that a heat treatment as taught in example II of **D1** did not inevitably lead to a moisture content of starch of 1 % by weight or less. Indeed, Example II of **D1** was performed using native tapioca starch drum-dried

from a slurry of pH 7 to a moisture content of 2.5 %, which was placed in a dextriniser and held for 4-6 hours at 149°C. It is true that these conditions appear at first glance to be taught in the patent in suit as being suitable for ensuring the claimed dehydration of starch and its inhibition (see paragraphs [0014]; [0033]; [0042]; [0048]; [examples 1-7 and 9]). The examples of the contested patent for example were also performed "using a conventional oven or a dextriniser" (paragraph [0048]) and using very similar conditions of pH, temperature, and duration of heating than in **D1**. However, the patent specifies in paragraph [0048] that the starch was dehydrated up to a moisture level of "about 0 %", which indicates that specific experimental conditions have been chosen so as to achieve this criteria. The results of **D15** show that these specific experimental conditions have not mandatorily been used in example II of **D1**;

- Example IV of **D1** does not give any information regarding the heat treatment used. Hence, no conclusion can be reached regarding the moisture content of the starch in this example.
- The appellant has also demonstrated in **D15** that a heat treatment made using a microwave oven as taught in example V of **D1**, although it is taught in the patent as being suitably used (see paragraphs [0014], line 22 and [0042], line 15), did not inevitably lead to a dehydration to a moisture content of 1 % or less;
- The data of **D13** and **D15** demonstrate that the starches obtained by the processes recited in [claim 1] are, indeed, characterised by their preparation process. Graph 1 of **D13** and Fig. 1 of

D15 show that the properties of starches prepared according to the patent in suit differ from those of starches prepared according to the teaching of **D1** and which have not been dehydrated to a moisture content of 1 % by weight or less.

Hence, the board considers that **D1** does not disclose non-granular starches obtainable by a process defined in [claim 1], which is in particular characterised in that they were inhibited by a thermal treatment comprising a dehydration up to a moisture content of 1 % by weight or less.

2.3.2 Food products disclosed in **D1**

The board is further satisfied that this difference found in the starches also effectively characterises the food products comprising said starches. As explained in the preceding section, the data on file show that the dehydration treatment defined in [claim 1] leads to a higher degree of inhibition of starch than in **D1**. The board considers that there is no evidence on file showing that this difference in the starches used may disappear during the preparation of food products comprising said starches. It is in particular conspicuous to the board that the preparation processes disclosed in examples VIII-X of **D1** comprise the mere blending, mixing under low speed and cooling of starches prepared according to the teaching of **D1**: it is neither plausible nor is there any evidence on file that the food products so obtained anticipate the subject matter of [claim 1].
Finally, **D15** shows that compositions comprising a starch according to the patent in suit exhibit a much

higher Brabender viscosity than compositions comprising a starch according to **D1** which was not dehydrated to - substantially - anhydrous. These data are, in the board's view, also evidence that the food products disclosed in **D1** are effectively different from those claimed. The respondent has is in particular provided no evidence that any of the food products exemplified in **D1** falls under the scope of [claim 1].

2.3.3 Hence, the board concludes that **D1** does not clearly and unambiguously disclose a food product according to the main request.

2.4 Document **D2**

2.4.1 Starches disclosed in **D2**

D2 deals with a process for making starch/flour having the viscosity and textural characteristics of a chemically crosslinked starch but without the use of chemical reagents and further aims at providing starch usable in the food industry (**D2**: page 1, lines 5-13; page 4, lines 1-14), i.e. which have to exhibit good organoleptic properties as assessed in its example 7 (Tables IX and X on pages 28-33). The process disclosed in claim 1 of **D2** reads as follows:

"1. A process for making a heat treated starch that is noncohesive when dispersed in an aqueous medium and gelatinized comprising the steps:

(a) providing a native granular starch at a neutral or basic pH;

(b) dehydrating the starch to a moisture content of 5 % or less; and

(c) heating the dehydrated starch at a temperature of 100 °C or greater for a period of time effective to cause the starch to be noncohesive when it is dispersed in an aqueous medium and gelatinized, the heat treated starch being the functional equivalent to a chemically crosslinked or modified starch."

According to page 5, lines 1-2 of **D2** the term "native" means "a starch that has not been chemically crosslinked, modified or treated in any way". **D2** further teaches that starch should preferably be dehydrated to a moisture content as low as 3 % or less, most preferably 1 % or less before the heating step (page 9, line 22 to page 10, line 2). Screening Examples 5 and 6 (**D2**: pages 25-26) explicitly disclose starches according to the above process and which have been dehydrated to less than 1 % moisture and then heated in a fluidised bed reactor. Food Example 7 illustrates the use of various starches in a processed food product, a retorted white sauce.

However, the board did not find any reference in said Food Example 7 with regard to identity of the starch which was used. No specific reference to Screening Example 5 or to any other Example of **D2** could be in particular identified. Hence, the board agrees with the appellant that **D2** does not clearly and unambiguously disclose the combination of Examples 7 and 5, which was considered by the opposition division in the contested decision and relied upon by the respondent.

Besides, as acknowledged by the appellant, the only explicit reference made to pregelatinised starch with

regard to the processes taught in **D2** is found on page 12, lines 9-11, which indicates that starch according to **D2** may optionally be blended with pregelatinised starch in order to prepare food products. Hence, this passage does not refer to the pre- or post-modification of starches prepared according to the teaching of **D2** but to the mere preparation of starch blends. Hence, the board considers that although **D2** discloses a process leading to the provision of inhibited starch corresponding to step B and comprising both phases B1 and B2 as above defined, it fails to disclose a step of pregelatinising starch (step A) according to [claim 1]. Hence, the starches prepared in **D2** differ from those defined in [claim 1] in that they are granular and not non-granular.

2.4.2 Food products disclosed in **D2**

Regarding the food products, the board disagrees with the respondent that compositions obtained by dispersing and gelatinising a starch inhibited according to **D2** are identical to those comprising a starch which was inhibited and pregelatinised as defined in [claim 1]. Indeed, whereas gelatinising refers to making swollen starch granules which may or may not have lost their granular structure (see paragraph [0003]), the pregelatinisation step defined in [claim 1] requires the disruption of the granular structure of the starch. From the information on file, there is no reason to believe, in the board's view, that this structural difference of the starches may be lost upon preparation of a food product. There is, in particular, no evidence on file supporting the argument of the respondent that dispersing and gelatinising a starch prepared in **D2**

leads to a food comprising starch in the same physical state as it would be obtained from a starch which has been pregelatinised and thermally inhibited according to [claim 1]. On the contrary, the appellant has shown in **D14** (see in particular Tables 1-2) that the properties of food compositions comprising a starch prepared according to the patent in suit (i.e. thermally inhibited and pregelatinised) differed from those comprising a starch prepared according to **D2** (only thermally inhibited): it was in particular shown that instant white sauces prepared according to the contested patent exhibited an improved texture and were more effective in preventing lipid (margarine) separation as compared to those which were not pregelatinised. This confirms, in the board's view, that the products obtained in **D2** are effectively different from those defined in [claim 1] and, thus, do not anticipate the subject matter claimed.

Finally, the board agrees with the appellant that the heat treatment processes of the starches prepared in **D2** which are disclosed on page 12, lines 12-14 (namely pasteurisation or retorting) are not equivalent to "pregelatinising a starch or a flour using a process which disrupts the granular structure" as defined in [claim 1]. There is in particular no evidence on file that such a treatment would inevitably lead to a destruction of the granular structure of the inhibited starch prepared according to the teaching of **D2**. The argument of the respondent in this respect is, thus, rejected.

2.4.3 Hence, the board considers that it is neither plausible nor that there is any evidence on file showing that the

food products of **D2** anticipate the subject matter of [claim 1].

2.5 No other novelty objection was raised with regard to the other documents cited in the appeal proceedings. The board is also satisfied that none of these documents anticipates the subject matter claimed.

2.6 The subject matter of the main request is, thus, novel.

3. Inventive step

The inventive merit is assessed according to the problem-solution approach.

3.1 Closest prior art

The closest prior art for assessing inventive step is a prior art document disclosing subject matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications; A further criterion for the selection of the most promising starting point is the similarity of technical problem (see Case Law of the Boards of Appeal of the EPO, 6th Edition, 2010, I.D.3.1).

During the oral proceedings before the board, both the appellant and the respondent identified **D2** as representing the closest prior art. The board shares this point of view because **D2** deals, like the patent in suit, with a process for making starch/flour having the viscosity and textural characteristics of a chemically

crosslinked starch/flour but without the use of chemical reagents and further aims at providing starch/flour usable in the food industry, i.e. which exhibit good organoleptic properties (**D2**: example 7; Tables IX and X on pages 28-33). **D2** is, thus, in the board's view, the most promising starting point for the skilled person confronted with the technical problem addressed in the patent in suit.

3.2 Defining the alleged problem solved in view of the closest prior art **D2**

The respondent has identified this problem as being the provision of a non-granular starch and of a food containing said starch having improved viscosity and reduced margarine separation independently of whether or not the product is retorted as compared to **D2** and which remains "clean-labelled" i.e. non chemically modified. The board acknowledges that said problem, although not explicitly addressed as such in the contested patent, is nevertheless derivable therefrom, in particular because it aims at improving the organoleptic properties of food products (see paragraphs [0008], [0009], [0019], and [0043], [examples]).

3.3 The solution

The solution proposed by the patent resides in providing a product by a process, which according to [claim 1], comprises steps A and B as previously defined i.e. which combines a thermal inhibition treatment according to **D2** (step B) with an additional pregelatinisation (step A).

3.4 Examination of the success of the solution - objective problem effectively solved

[Examples 1-6] together with the examples of **D14** show that the problem identified in section 3.2 is indeed solved by processes defined in [claim 1]. [Example 1] in particular illustrates a process comprising the sequence of steps A→B and leads to the provision of unmodified instant starches having sufficiently high viscosity and low percentage breakdowns in viscosity, which is an indication of thermal inhibition (see paragraph [0043]). Besides, [examples 2-6] all show that similar starches may be obtained using various processes comprising either the sequence of steps A→B or B→A. Finally, the data reported in Table 2 of **D14** show that instant white sauces prepared according to the contested patent exhibit an improved texture and are more effective in preventing lipid (margarine) separation.
Hence, the board is satisfied that the problem identified above represents the objective problem which is effectively solved.

3.5 Examining whether the proposed solution is obvious with regard to the state of the art

3.5.1 It is to be decided here whether or not it was obvious to solve the objective problem identified above, and in particular to achieve said improvements, by modifying the food products of **D2** according to [claim 1], i.e. whether or not it was obvious to modify the process of preparation of starch taught in **D2** by pregelatinising

the starch either before or after the thermal inhibition taught in **D2**.

3.5.2 It was established earlier in this decision that **D2** does not disclose a pregelatinisation step at all (see section 2.4 above) and could not, thus, lead to the solution provided by the patent in suit in an obvious manner on its own.

The board was not convinced by the argument of the respondent according to which it would have been obvious to modify the teaching of **D2** so as to go from granular to non-granular starches. It is agreed with the appellant that it is established that granular and non-granular starches are products having completely different structure, properties and functions. Hence, considering that **D2** does not mention pregelatinisation at all, it is to be concluded that the inventors of **D2** had not contemplated this further treatment as an obvious alternative. In this regard, the board is in particular of the opinion that starting from **D2**, which aims at reinforcing the granular structure of starch by way of thermal inhibition i.e. crosslinking, the skilled person would have had no reason to further modify the starches - which are intended to be toughened - in order to precisely disrupt i.e. weaken their granular structure. Hence, the board considers that the skilled person would have had no good reason, not knowing the present invention, to modify the teaching of **D2** according to [claim 1] (could/would approach).
The argument of the respondent that the skilled person would have done so because it represented an obvious alternative is, in the board's view, based on hindsight,

knowing the result of the patent and relying on the achieved commercial success of the products so obtained (see **D12**).

The same holds true regarding the alleged obviousness of the modification made based on the teaching read out of the data of **D2** by the respondent. Even if these data would show that the starches are increasingly "non cohesive" when the heating time is prolonged, this gives no indication with regard to the pregelatinisation step or to the disruption of the starch granules so-obtained. Besides, there is no indication in **D2** which would have motivated the skilled person to do so in order to achieve the improvement in viscosity and margarine separation demonstrated by the appellant.

Hence, the board rejects the argument of the respondent that the subject matter claimed represented a minor and obvious modification of the teaching of **D2**.

3.5.3 It remains, however, to be decided if the other documents of the prior art would have rendered obvious this combination. Although this part of the argumentation was not pursued by the respondent during the oral proceedings, objections of lack of inventive step based on the combination of **D2** with either **D1**, **D3**, **D4** or the documents cited on [page 4] had been made in writing.

3.5.4 In this regard, the board first agrees with the appellant that none of the documents cited in the proceedings may provide a solution to the above identified problem since, in particular, none of them provides a means simultaneously to improve viscosity

and the lipid (margarine) separation of "clean-labelled" food products.

3.5.5 **D2** in combination with **D1**

The board considers that the combination of **D1** and **D2** would not have been contemplated by the skilled person because the processes taught in these documents both start from native starches (**D1**: claim 1 and page 3, lines 35-45; **D2**: claim 1 and page 5, lines 1-5): they are thus mutually excluding and can not be combined, in any sequence (neither **D1→D2** nor **D2→D1**). Besides, the process of **D2** starts with granular starches, which excludes the possibility of applying the process of **D2** to the non-granular starches obtained in **D1** (i.e. sequence **D1→D2**).
The combination of **D2** and **D1** would, thus, not be contemplated by the skilled person faced with the above identified problem.

3.5.6 The board is further of the opinion that **D3** does not deal with the preparation of "clean labelled" food products and is, thus, not concerned with the problem addressed by the patent in suit. Besides, **D3** only deals with granular starches and does not concern pregelatinisation, so that its combination with the teaching of **D2** can not render obvious the subject matter claimed in the patent in suit for the same reasons as given in section 3.5.2 above.

3.5.7 The same holds true for the combination of **D2** with any of the prior art documents dealing with the pregelatinisation of starches cited on [page 4].

3.5.8 **D2** in combination with **D4**

As already argued above, since the process of **D2** starts from a native, untreated starch, the only combination of **D2** and **D4** which might be contemplated would be to thermally inhibit a starch according to **D2** first, followed by the treatment taught in **D4**.

However, **D4** is limited to processes for jet-cooking and spray drying high amylose starches i.e. having an amylose content of above 40 % (**D4**: claims; col. 10, lines 3-24). Since **D2** does not disclose any high amylose starch, the combination of **D2** and **D4** is *per se* not obvious.

Besides, **D4** specifically teaches away from a combination with **D2** since its process is disclosed as not suitably used on crosslinked i.e. inhibited starches. Indeed, col. 7, lines 58-63 reads "Modification by crosslinking is possible but not desirable…. Lightly crosslinked starches … are suitable, whereas heavily crosslinked starches … are not suitable". This teaching is further confirmed by the statement made at col. 10, lines 3-7: "Any cookable, granular unmodified or modified starch or previously cooked starch (…) other than a highly crosslinked starch is suitable as a starting material for use in the present process". Since **D2** precisely deals with the preparation of such highly crosslinked starches, the board considers that the skilled person would, on the basis of the information provided in **D4**, be prevented from treating according to **D4** starches obtained by a process according to **D2**.

The board, thus, rejects the objection of lack of inventive step raised by the respondent which was based on the combination of **D2** and **D4**.

3.5.9 **D2** in combination with **D5**

The respondent has not raised any objection in this sense. The board is also satisfied that the combination of these documents does not render the subject matter claimed obvious.

Taking into consideration that the process of **D2** starts from a native, untreated starch, the only combination of **D2** and **D5** which might be contemplated would be to thermally inhibit a starch according to **D2** first, followed by the combined off flavours and pregelatinisation treatment taught in **D5**. However, these two processes are antagonistic to each other: whereas the process of **D2** leads to the inhibition i.e. crosslinking and reinforcing of the starch granules, the processes of **D5** rely on the opening of said granules, as unambiguously taught in col. 2, lines 35-39. It is further conspicuous to the board that **D5** contains no indication or hint which would lead the skilled person to believe that the process disclosed therein would also work with inhibited starches as prepared in **D2**, i.e. starches wherein the granules have been crosslinked and, thus, toughened.

In this regard, the board is further of the opinion that starting from **D2**, which aims at reinforcing the granular structure of starch by way of thermal inhibition i.e. crosslinking, the skilled person would have had no reason further to modify those toughened

starches in order precisely to disrupt i.e. weaken said granular structure. Hence, the board considers that the skilled person would have had no good reason, not knowing the present invention, to merely combine and/or juxtapose the processes of **D2** and **D5** (could/would approach).

3.6 The board is aware that, in the written phase of the appeal proceedings, the appellant had also considered either **D1** or **D3** as suitable closest prior art in alternative to **D2**. These objections were, however, not pursued by the respondent during the oral proceedings.

In this regard, the board is of the opinion that **D1** could not lead in an obvious manner to the subject matter claimed in the patent in suit. Indeed, as shown in section 2.3 above, **D1** does not unambiguously disclose that starch is dehydrated to a moisture content of 1 % by weight or less. **D1**, in addition, is silent with regard to the effect of inhibiting i.e. crosslinking starch and provides no hint which would have motivated the skilled person to push the heat treatment so as to achieve said moisture content. Hence, from the content of **D1** alone, the skilled person *would* have had no reason, without knowing the patent in suit, to treat starch according to [claim 1]. Besides, from all the documents cited in the proceedings, **D2** is the only document which discloses a thermal inhibition treatment of starch by a process comprising a dehydration up to a moisture content of 1 % by weight or less. However, starting from **D1**, the combination of **D1** and **D2** would not have been contemplated by the skilled person as explained in section 3.5.5 above.

The board, thus, concludes that it would not have been obvious to combine the teaching of **D1** and **D2**.

That **D3** is not a valid closest prior art is derivable from the fact that it does not deal with the problem addressed by the patent in suit.

3.7 Therefore, the board is satisfied that the main request fulfils the requirements of Art. 56 EPC.

4. The main request of the appellant (patent proprietor) being allowable there is no need for the board to consider its auxiliary requests 1-4.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar: The Chairman:

E. Görgmaier R. Young