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D E C I S I O N
of 15 June 2005

Case Number: T 0107/02 - 3.3.6

Application Number: 95202472.7

Publication Number: 0703314

IPC: D21H 17/24

Language of the proceedings: EN

Title of invention:

Method for manufacturing paper, and paper manufactured thereby

Patentee:

Coöperatieve Verkoop- en Productievereniging van Aardappelmeel
en Derivaten 'AVEBE' B.A.

Opponent:

Zuckerforschung Tulln GmbH
Sveriges Stärkelseproducenter Förening U.P.A.

Headword:

Paper-making method/AVEBE

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (all requests) - no: obvious modification of
the prior art"

Decisions cited:

-

Catchword:

-



Case Number: T 0107/02 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 15 June 2005

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
29 November 2001 concerning maintenance of
European patent No. 0703314 in amended form.

Composition of the Board:

Chairman: G. Dischinger-Höppler
Members: P. Ammendola
A. Pignatelli

Summary of Facts and Submissions

- I. This appeal is from the interlocutory decision of the Opposition Division concerning the maintenance in amended form of the European patent No. 0 703 314.
- II. Two oppositions had been filed against the grant of this patent. Both were based on the grounds of lack of novelty and inventive step (Article 100(a) in combination with Articles 52(1), 54 and 56 EPC). The following documents had been cited, *inter alia*, during the opposition proceedings:
- D4 = WO 86/00100
- D6 = WO 92/11376
- D7 = H.G.M. van de Steeg "*Cationic Starches On Cellulose Surfaces*", 1992, pages 51 and 107 to 118
- D8 = R.T. Mc Queary *et al.* "*Cationic And Amphoteric Wet End Starches*", TAPPI Seminar Notes: Wet and Dry Strength, 1988, p.59 to 64
- D10 = B.M. Jensen *et al.* "*Cationic Potato Starches Proven Effective As Wet End Additives*", Pulp & Paper, April 1986, pages 83 to 85.
- III. The Opposition Division found that the amended claims and description according to the then pending first auxiliary request of the Patent proprietor complied with the requirements of EPC.

Claim 1 of this request (hereinafter "main request") read:

"1. A method for manufacturing paper, which comprises adding to an aqueous suspension of cellulose fibers a water-soluble or dissolved cationic starch, in addition to fillers, and then forming paper from this suspension in the conventional manner, characterized in that as cationic starch a cationic amylopectin potato starch is used, wherein the amylopectin potato starch is isolated from potatoes originating from potato plants obtained by mutation or by antisense inhibition, so that the potato starch has an amylopectin content of at least 95% by weight, calculated on the dry substance."

IV. In its decision the Opposition Division considered *inter alia* that the disclosure of D7 or D8 would not have rendered obvious to solve the technical problem of simultaneously improving the strength and the filler retention of paper by using in the paper-making process disclosed in D4 the cationically modified amylopectin-rich potato starch (hereinafter "cationic ARPS") disclosed in D6, obtained from potatoes which have been genetically engineered so as to produce a starch consisting substantially of amylopectin only.

V. Opponent I (hereinafter "Party as of right") and Opponent II (hereinafter "Appellant") have lodged an appeal against this decision. Both have contested exclusively the presence of an inventive step for the subject-matter of the above claims found patentable by the Opposition Division. The Party as of right has then

withdrawn its appeal by fax of 9 June 2005 and was not represented at the oral proceedings before the Board on 15 June 2005.

VI. The Patent proprietor (hereinafter "Respondent") has filed under cover of a letter dated 15 March 2005 three sets of amended claims labelled as auxiliary requests I to III.

Claim 1 of the auxiliary request I differs from the amended claim 1 of the main request (see above point III) only in that the wordings "*a water soluble*" and "*characterized in that as cationic starch a cationic amylopectin potato starch is used, wherein the*" have been respectively replaced by "*a pre-gelatinized, water soluble*" and by "*wherein as cationic starch a cationic amylopectin potato starch is used, which*".

Claim 1 of the auxiliary request II differs from that of the auxiliary request I only in that the feature "*, and wherein the cationic amylopectin potato starch has a degree of substitution between 0.005 and 0.5*" has been added at the end of the claim.

Claim 1 of the auxiliary request III differs from that of the auxiliary request I only in that the feature "*, and wherein the cationic amylopectin potato starch is added in an amount of 0.05 to 10% by weight (dry substance) calculated on the aqueous suspension of cellulose fibers (dry substance)*" has been added at the end of the claim.

VII. The Appellant has submitted, orally and in writing, the following arguments:

The patent in suit aimed at achieving a level of filler retention and paper strength superior to that obtainable by using the starch wet end binders of the prior art, in particular the cationic derivative of the natural potato starch (hereinafter "cationic PS") which consisted of cationic amylopectin and amylose and which was known to be the best performing and, therefore, the most used among the starch wet end binders, also in view of the produced filler retention and paper strength.

Such prior art was disclosed in D10 but relevant prior art was also disclosed in D4, even though the latter seemed more remote because it only referred to the use of mixtures of binders.

Regardless as to which of these two prior art processes would be considered the most relevant prior art, the acknowledgement in D8 and D7 of the known dependence of the desired paper properties on the amylopectin component of natural starch binders would have suggested to the skilled person to use the cationic PS with the highest content in amylopectin in order to solve the existing technical problem.

Thus it would have been obvious for the skilled person to replace in the prior art paper-making processes disclosed in D10 or D4 the cationic PS binders by the cationic ARPS, which was disclosed in D6 as useful for paper-making.

The added features distinguishing each claim 1 of the auxiliary requests I to III from that of the main request could not contribute any inventive step because they were all already known and conventional in the art. These characteristics were disclosed in the patent in suit without any indication of additional advantages associated therewith.

VIII. In its statement setting out the grounds of appeal, the Party as of right has considered that the combination of the prior art disclosed in documents D4 and D6 rendered the subject-matter of claim 1 of the main request an obvious alternative to the method of D4.

IX. The Respondent has argued in writing and orally substantially as follows.

The prior art disclosed in D4 represented the most appropriate starting point for the assessment of inventive step, since it mentioned pure amylopectin cationic binders and addressed the same technical problem of the patent in suit, i.e. providing a paper with improved filler retention and strength.

The best performing and most used starch binder of the prior art was the cationic PS, but waxy cereal starches containing only amylopectin - such as waxy maize or waxy rice starches - could also be used as amylopectin-rich wet end binders. In particular, cationic waxy maize starch had found industrial application. These facts would demonstrate, on the one side, that several alternatives were available to the skilled person for realising the embodiments of the process of D4 based on amylopectin and, on the other side, that the mechanism

of action of the wet end starch binder would be so complex that no reliable prediction might be derived simply from the knowledge that in some natural starches the amylopectin component was found responsible for the improvement of paper strength and filler retention. In particular, no forecast as to the properties provided by the chemically modified derivatives of starches would be possible, as demonstrated by the wrong prediction as to the relative efficacy of cationic waxy maize starch and cationic PS, contained in the last three sentences of section 6.4.3, at page 116 of D7.

Moreover, D7 and D8 would teach away from the use of ARPS, because these citations would rather suggest using starches of other origin. In addition, D7 would stress the superior self-adsorption of the amylose fraction of conventional PS, thereby confirming that the skilled person would not arbitrarily omit the advantageous amylose component of this starch.

Finally, the disclosure in D6 would not suggests the use of cationic derivatives of ARPS as wet end binders, because this citation only mentioned in general these compounds, without even specifying that they could be generically applicable in paper-making.

Therefore, the skilled person would have no reason for replacing the cationic binders disclosed in D4 with the cationic ARPS of D6 and, in particular, for expecting that such substitution would have resulted in an improvement of filler retention and paper strength.

The subject-matter of claim 1 of the auxiliary requests I to III was not obvious since there was no reasons for a skilled person to select specifically any of the added features among the very large number of alternative embodiments of the process of D4 and/or the ARPS of D6.

- X. The Appellant has requested that the decision under appeal be set aside and that the European patent No. 0 703 314 be revoked.

- XI. The Respondent has requested that the appeal be dismissed and the patent be maintained in the form found by the Opposition Division to comply with the requirements of the EPC (main request) or, alternatively, on the basis of the claims of any of the three auxiliary requests filed under cover of the letter dated 15 March 2005.

- XII. At the end of the oral proceedings of 15 June 2005 the Chairman has announced the decision of the Board.

Reasons for the Decision

Claim 1 of the main request.

- 1. *Inventive step (Articles 52(1) and 56 EPC)*
 - 1.1 Claim 1 of the main request describes a paper-making process wherein cationic ARPS derived from potatoes obtained by specific mutation of the potato plant and fillers are added to the wet end (see above point III of the Facts and Submissions).

1.2 The Board concurs with the parties that the patent in suit addresses the technical problem (see in particular paragraph 15 in combination with the prior art resumed at paragraphs 2 to 8 and with the examples) of **providing paper with filler retention and strength superior to that obtainable by the use of the prior art wet end starch binders**. It is undisputed that the aim of the patent is achieving such improvement vis-à-vis the prior art binders mentioned in the patent in suit, including the cationic PS and the amylopectin mentioned in D4 (cited in paragraph 7 of the patent in suit) and the waxy maize starch. In particular, this latter and the cationic PS are the starches used as comparative examples in the patent in suit (see Tables 1, 3 and 4).

1.3 D4 discloses a paper-making process comprising the addition to the wet end of fillers and wet end starch binders (see D4 claims 1 and 13 and examples 1 to 6). Moreover, this prior art process clearly aims at "*maximising*" the filler retention and the strength of the obtained paper (see D4 page 2, lines 11 to 32).

Therefore, the Board concurs with the Respondent that the prior art disclosed in D4 represents a reasonable starting point for the assessment of inventive step.

1.4 The starch binders specifically considered in this citation were, among others, cationic PS binder or cationic amylopectin of unspecified origin (see D4 page 10, lines 26 to page 11, line 15 and the examples 1, 2, 6 and 7).

Hence, the paper-making method of claim 1 under consideration differs from that disclosed in D4 only in that the cationic ARPS replaces these cationic binders used in this prior art.

- 1.4.1 The Respondent has argued that a further relevant difference would derive from the fact that, while present claim 1 does not require the presence of an additional anionic binder, the latter ingredient is instead mandatory in the process of D4 (see D4 claim 1).
- 1.4.2 The Board observes, however, that claim 1 does not exclude the possible presence of further binders. Thus, the claimed subject-matter embraces also paper-making processes comprising the use of the same additional anionic binder that is mandatory in D4.
- 1.5 The Board has no reason to doubt that the subject-matter of present claim 1 provides a paper with improved filler retention and strength compared with the paper achieved by the prior art process of D4 (see the examples in the patent in suit). This has not even been contested by the Appellant.

Hence, in the present case the assessment of inventive step boils down to establishing whether or not it would have been obvious for the skilled person at the priority date of the patent in suit to replace the cationic binders used in the paper-making process of D4 by cationic ARPS derived from genetically modified potatoes, in the reasonable expectation that such modification would further improve the filler retention and strength of the obtained paper.

1.6 Cationic ARPS derived from potatoes which have been genetically engineered so as to suppress the formation of amylose is known from D6 (see page 5, line 24 to page 6, line 32, page 12, lines 12 to 31, and example 3).

The Respondent has considered not pertinent this prior art, since D6 neither disclosed specifically the use of cationic ARPS as wet end binder for paper, nor even mentioned its use in paper-making in general.

1.6.1 The Board finds this argument not convincing because D6 refers generically to the application of starches in the paper industry (see page 1, lines 15 to 16) and, thus, suggests to the skilled person the possibility of using any compound mentioned therein in any conventional paper-making process.

Moreover, it is evident from the very large number of vegetal starches or modifications thereof which have been tested and studied in view of their possible application as wet end binders (see all the previously cited documents and paragraphs 2 to 8 in the patent in suit) that the skilled person would consider whether any new vegetal starch or modification thereof becoming available on the market or from patent or scientific literature disclosure might also be suitable as wet end binder, regardless as to whether the product label or the relevant publications make explicit reference specifically to such use.

1.7 Further, D7 and D8, which both relate to studies on the behaviour of different cationic starches in paper-making, remind to the skilled person that it was state

of the art already before their publication dates that the amylopectin fraction of natural starch was responsible for the paper strength and filler retention provided by these compounds (see in D7, page 161, section 6.4.3 "*...it was found by several investigators that native amylopectin improves dry strength more than amylose...*"; in D8 page 59, right column "*Amylopectin is a much larger branched polymer. ... This portion of the starch has been identified as the source of the retention and drainage benefits obtained from wet end starch.*").

1.7.1 This previous knowledge does not refer explicitly to the cationic derivatives of natural starches. However, the skilled person would have reasonably expected that the amylopectin fraction of the starch binders would remain responsible for the desired properties also after the cationic modification of these starches, unless there was evidence to the contrary.

1.7.2 In this respect the Respondent has merely indicated that the influence starch binders exercise on the properties of the obtained paper is not easily predictable. In particular, it has underlined that D7 hypothesises that the cationic maize starch might possibly be preferable to cationic PS for increasing paper strength (see the last three sentences of section 6.4.3 at page 161 of D7), but that the skilled person would instead know that this prediction in D7 was wrong, since cationic maize starches never replaced cationic PS. This was also confirmed by the properties observed in the comparative samples in the patent in suit.

1.7.3 The relevant information given at page 116 of D7 is as follows:

"Since it has been found by several investigators that native amylopectin improves dry strength more than amylose [36, 37, 38], it would be interesting to know whether the same holds for the cationic derivatives. If that is indeed the case, it may be more effective to use cationic waxy maize instead of cationic potato starch to obtain the desired dry strength. To papermakers, therefore, comparison between the dry strength gained by the addition of cationic potato starch and cationic waxy maize can be of importance."

Irrespective of whether or not cationic waxy maize starch turns out to be worse than cationic PS, the information nevertheless emphasises the relevance of amylopectin on the dry strength and invites the skilled person to investigate whether this finding holds true also for the cationically modified starches.

1.8 Accordingly, the skilled person searching for a solution to the existing problem in view of D4 (see above point 1.5) and aware of the above information in D7 would have considered not only cationic waxy maize starch but also the cationic ARPS disclosed in D6 a suitable candidate for such investigation since it also consists substantially of cationic amylopectin.

1.9 Therefore, the Board finds that it was obvious for the skilled person to try and replace the cationic PS in the process of D4 by the cationic ARPS disclosed in D6, in the reasonable expectation to obtain a paper with further improved filler retention and strength. Thereby

the skilled person would have arrived at the claimed subject-matter without exercising any inventive skill.

- 1.10 The Respondent has objected that D7 and D8 could not possibly render obvious the claimed process because they would lead away from the invention.

In particular, D8 would disclose the superior filler retention and paper strength obtained when using amphoteric starches instead of cationic starches (see D8 page 62, left column, last paragraph and figures 8 and 9).

Moreover, D7 stressed the superior self-retention of the amylose component (see in D7 page 115, lines 3 to 6; confirmed also in D10, page 83, right column, lines 2 to 5), a property which, in the opinion of the Respondent, would be relevant for the application of starches as wet end binders.

- 1.10.1 The Board observes that PS is known to contain naturally occurring phosphate groups so that cationic PS - unlike cationic waxy maize starch - is amphoteric (see D10 page 83, right-hand column, second full paragraph). The preference in D8 of amphoteric starches is, therefore, a further hint for the skilled person to use cationic starches derived from potatoes instead of cationic waxy maize starch.

- 1.10.2 Moreover, the Board observes that the skilled person would actually find in D7 no indication that the amylose component of natural starch plays a role in improving the desired filler retention and paper strength properties. In particular, there is no

evidence that the superior self-retention of the amylose component is related with the achievement of these properties.

1.10.3 Therefore, the disclosure in D7 and D8 does not prevent the skilled person from considering the cationic ARPS disclosed in D6 as a suitable binder in the process of D4.

1.11 The Respondent has also maintained that the skilled person searching for amylopectin-rich starches would have had several other alternatives rather than only the cationic ARPS of D6. For instance, other kinds of modified ARPS were also disclosed in D6 or several modified or unmodified waxy cereal starches were obtainable starting from maize or rice.

1.11.1 The Board observes that, as discussed above at point 1.7.3, the information of D7 explicitly focuses the skilled person's attention on the amylopectin fraction of the cationic PS and of the waxy maize starch. Therefore, even if other amylopectin-rich starches could possibly be considered by the skilled person for improving filler retention and paper strength, they would at most represent further obvious solutions to the existing technical problem, but not prevent the skilled person from immediately recognising that the cationic ARPS of D6 is suitable for that purpose.

1.12 The Board comes, therefore, to the conclusion that the subject-matter of claim 1 of the main request does not involve an inventive step and, hence, that this request is not allowable because it does not comply with the requirements of Articles 52(1) and 56 EPC.

Claim 1 of the auxiliary requests I, claim 1 of the auxiliary request II and claim 1 of the auxiliary request III.

2. Inventive step (Articles 52(1) and 56 EPC)

2.1 The Board observes that, as correctly underlined by the Appellant (see above point VII of the Facts and Submissions), the features which distinguish the claims under consideration from claim 1 of the main request (see above point III of the Facts and Submissions) were already known from D4 and/or D6 and that the description of the patent in suit does not associate to them any particular advantage. In particular, the feature of "*pre-gelatinization*" (added in claim 1 of any of these auxiliary requests) is mentioned in examples 6 and 7 of D6, degrees of substitution encompassed within the range "*between 0.005 and 0.5*" (as required in claim 1 of the auxiliary request II) are disclosed in examples 3 and 4 of D6 and at page 9, lines 15 to 20, of D4 and amounts of starch encompassed between "*0.05 to 10% by weight (dry substance) calculated on the aqueous suspension of cellulose fibers (dry substance)*" (as required in claim 1 of the auxiliary request III) are given in Table 1 of D4. These facts have not been disputed by the Respondent, who has also conceded not to have any other evidence in this respect.

- 2.2 Under such circumstances it is apparent that these added features cannot possibly contribute any inventive step because they only provide three conventional embodiments of the method for paper-making defined in claim 1 of the main request, already found to be obvious.
- 2.3 The Respondent has however argued that inventive ingenuity had been necessary for selecting these added features because of the very high number of possible alternative embodiments embraced by claim 1 of the main request and since the skilled person would not have found in the prior art any hint to select specifically any of these features which have been added into the claims of the auxiliary requests.
- 2.3.1 The Board observes, however, that any conventional feature of wet end starch binders and their use, irrespective of their total number, is considered by the skilled person equally suitable for carrying out the process of D4 with the cationic ARPS binder of D6, i.e. they are all equally obvious solutions to such technical problem. Thus, even in the absence of any specific reason for preferring one or the other of these solutions which were available to the skilled person, applying one of them requires no particular skills and for this reason does not involve an inventive step (see e.g. the unpublished decision of this Board T 400/98 of 19 September 2002, No. 4.4.6 of the reasons, or T 939/92 of 12 September 1995, OJ EPO 1996, 309, No. 2.5.3 of the reasons and T 220/84 of 18 March 1986, No. 7 of the reasons).

2.4 The Board comes therefore to the conclusion that the subject-matter of each claim 1 of the three auxiliary requests I to III of the Respondent does not involve an inventive step and, hence, that none of these requests is allowable in view of the requirements of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

G. Rauh

G. Dischinger-Höppler