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D E C I S I O N
of 29 April 2002

Case Number: T 0556/00 - 3.2.7

Application Number: 92922922.7

Publication Number: 0626022

IPC: D21F 1/66

Language of the proceedings: EN

Title of invention:
A method for reducing the level of interference chemicals in the water circulation of wood-based fibre suspension processes

Patentee:
RAISIO CHEMICALS OY

OpponentS:
Sveriges Stärkelseproducenter, Förening UPA
Eka Chemicals AB
BetzDearborn, Inc.

Headword:
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Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
"Inventive step (yes)";
"Extension beyond the content of the application as filed (no)"

Decisions cited:
-

Catchword:

-

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Case Number: T 0556/00 - 3.2.7

D E C I S I O N
of the Technical Board of Appeal 3.2.7
of 29 April 2002

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 31 March 2000 concerning maintenance of European patent No. 0 626 022 in amended form.**

Composition of the Board:

Chairman: A. Burkhart
Members: K. Poalas
U. J. Tronser

Summary of Facts and Submissions

I. The appellant (opponent I) lodged an appeal against the interlocutory decision of the Opposition Division maintaining the European patent No. 0 626 022 in amended form.

Oppositions were filed against the patent as a whole based on Article 100(a) EPC (lack of novelty and lack of inventive step), Article 100(b) EPC (lack of enabling disclosure) and Article 100(c) EPC (extension beyond the content of the application as filed).

The Opposition Division held that the grounds for opposition mentioned in Articles 100(a), (b) and (c) EPC did not prejudice the maintenance of the patent as amended.

II. Oral Proceedings before the Board of Appeal took place on 29 April 2002.

(i) The appellant requested that the decision under appeal be set aside and the patent revoked.

(ii) The respondent requested that the appeal be dismissed.

(iii) Independent claim 1 of the patent in suit as amended reads as follows:

"1. A method for reducing the amount of interference substances, such as wood extracts, coating binder residues, deinking chemicals, ink residues, etc, in the water circulations of processes involving a web formation by dewatering of wood-based fibre

suspensions, **characterized** in that at a stage preceding the web formation, cationised starch having a charge state of 1.5-3.5 meqv/g is added to the fibre suspension in an amount of approximately 0.04 - 0.5% of the fibre dry matter in order to fix the interference substances from the water circulation to the fibres to be subjected to the web formation, the cationised starch being added before the stock starch and the retention agent."

(iv) During the oral proceedings the appellant referred to the following documents

D2: SE-A-7714787-4 (English translation)

D3: "Handbook of Pulp & Paper Terminology", Gary A. Smook, Angus Wilde Publications, Vancouver, 1990, pages 56, 60, 160, 169, 191

D6: JP-A-1980-12868 (English translation)

D7: C. E. Farley, Paper presented at the 1987 Papermakers Conference, Tappi Proceedings, Tappi Press, pages 295 to 299

D10: C.Palm and J.L. Hemmes, Paper presented at the yearly APV meeting 1990 in Darmstadt and published in Wochenblatt für Papierfabrikation 5/1991, pages 149 to 156

III. The appellant argued essentially as follows:

(a) The feature of claim 1

"the cationised starch being added before the

stock starch and the retention agent"

was not disclosed in the originally filed application. The passage on page 4, lines 16 to 18 of the originally filed application discloses a reference to the prior art. According to this passage the point of dosage is "immediately after the stock storage tank before the other chemicals are added to the system". The amendment of claim 1 is not restricted in this way, but covers addition of the cationised starch at any point. Moreover, the statement on page 5, lines 18 to 22, which is the sole location in the originally filed application referring to the sequence of the addition of the substances cationised starch, stock starch and retention agent of the process of the invention, is more specific than the above mentioned feature of claim 1. This statement on page 5 relates to a specific working example for which a number of specifically defined conditions or features apply. It is an unallowable generalization of the disclosure of the application as originally filed to select one of the features from such a specific example with certain specific features and take it out of its context and introduce it into claim 1 and then submit that this feature applies generally to the claimed invention without any connection with the other features mentioned in the example from which the feature has been taken.

Therefore, the amended claim 1 of the patent in suit does not meet the requirements of Article 123(2) EPC.

(b) Document D6 being the most relevant prior art document relates to the same problem as the opposed patent, namely the sealing or fixing of interfering anionic materials in a neutral papermaking method. The problem is solved by adding a low-molecular cationising agent (see page 4, the first and penultimate paragraph). As an example of such a low-molecular cationising agent cationic starch is mentioned (see page 4, last paragraph and Example 5). The cationising agent is added before the cationic auxiliaries are added to the pulp slurry (see page 4, the first and penultimate paragraphs, and page 5, the first paragraph). The amount of cationising agent added is such that the zeta potential of the slurry is from - 10 mV to +5 mV (see page 5, the second paragraph) which in Example 5 results in an added amount of cationic starch (Posibarine C) of 0.5% by weight. Posibarine C from Matsutani Kagaku has a slightly lower charge density than that of Raisamyl 135 (0.21 meqv/g).
Document D6 discloses therefore all the features of claim 1, except the feature that the cationised starch should have a charge state of 1.5-3.5 meqv/g.

Document D2 discloses a highly cationic starch with a degree of substitution of 0.1-1.0 (see page 3, lines 2 to 3) which corresponds to a charge state of 0.57-3.12 meqv/g. On page 2, second paragraph, document D2 states that this highly cationic starch is usable as a flocculating agent, inter alia, in the treatment of wastewater and as a substance for improving the retention in the paper industry. Also, the highly cationic

starch of document D2 is said to be easy to produce in an economic manner.

In document D6 it is said that the addition of the cationising agent should bring the zeta potential of the slurry to lie in the range from -10 mV to +5 mV, preferably from -7 mV to +2 mV (see page 5, the second paragraph). According to Example 5 the cationic starch used (Posibarine C) brought the zeta potential to -9 mV, ie a value that does not apparently lie within the preferred range. Therefore, it is obvious to the person skilled in the art to try a more effective cationic starch, ie a cationic starch with as high a charge state as the one known from document D2, in order to improve the result obtained with Posibarine C used in Example 5 of document D6.

Moreover, Figure 4 on page 153 of document D10 shows that a starch having a higher degree of substitution is more effective than a starch having a lower degree of substitution.

Thus, the skilled person would have a clear incentive to try the cationic starch of document D2 in the process of document D6, thereby arriving at the method according to claim 1 of the patent in suit.

Also a combination of the disclosure of documents D7 and D2 leads the person skilled in the art to the process of claim 1:

Document D7 relates to the same problem as the patent in suit, namely the presence of anionic

trash in papermaking processes. Document D7 mentions that the problem of anionic trash in papermaking processes may be solved by adding a cationic polymer of the polyquaternary ammonium type with a very high charge density (see the abstract and the last two paragraphs on page 295 and page 296, the first two paragraphs). On page 297, the last paragraph of document D7 it is stated that "High molecular weight, highly cationic polymers, commonly used as drainage and retention aids, will give similar results, while also increasing overall retention" and on page 299, the right hand column, it is mentioned that the cationic polymer may be starch. The added amount of the cationic polymer is 0.075% (see Table 1), 0.05% (see Figures 4 and 7) and 0.06% (see Figure 5), ie within the range 0.04-0.5% required by claim 1 of the patent in suit. Further, the cationic polymer is added prior to addition of the cationic wet strength resin (see page 296, the first paragraph). Thus, all the features of claim 1 of the patent in suit are disclosed in document D7, except the feature that the value of the charge density of the cationic polymer with high charge density should lie in the range 1.5-3.5 meqv/g.

A cationic starch with a very high charge density of 0.57-3.12 meqv/g is known from document D2 (see page 3). This cationic starch is said to be useful, inter alia, as a substance for improving the retention in the paper industry (see page 2).

Therefore, if the skilled person was looking for a high molecular weight, highly cationic polymer

such as highly cationic starch for use in document D7 he would have a clear incentive to choose the cationic starch of document D2 and would thereby arrive at the method of claim 1 of the patent in suit.

For these reasons the claim 1 of the patent in suit does not involve an inventive step.

IV. The respondent argued essentially as follows:

(a) The passages on page 3, lines 23 to 26; on page 4, lines 16 to 18 and 30 to 34; and on page 5, lines 1, 2 and 16 to 25 of the originally filed application form a clear basis for the amendment of claim 1 of the patent in suit: "the cationised starch being added before the stock starch and the retention agent".

Therefore, the claim 1 of the patent in suit meets the requirements of Article 123(2) EPC.

(b) Document D6 relates to the same technical field as the patent in suit in that it concerns a method for reducing the negative effects of anionic trash in fibre suspensions in order to increase the efficiency of the paper-making additives used in the process. Document D6 suggests the use of a number of different cationic substances for this purpose, one of which is cationic starch. Document D6 contains one example, Example 5, where a cationic starch is in fact used to improve the performance of a polyamidepolyamine-freeness improving agent. However, the cationic starch used in Example 5 has a low cationic charge level being

in fact similar to that of ordinary stock starch.

There is no pointer in document D6 for increasing the charge level of cationised starch in order to achieve better results. In fact, the agent of choice in document D6 is an inorganic aluminium compound (page 5, first paragraph). Moreover, the person skilled in the art learns from the Examples 1 to 4 of document D6 that cationic substances other than cationic starch achieve better zeta-potential-values.

In view of the teaching of document D6, the person skilled in the art has no incentive to concentrate on Example 5 and to increase the charge level of the cationised starch in order to improve the effectiveness and to use a highly cationised starch as disclosed in document D2.

Document D7 is a review of the use of polyelectrolytes to optimise the efficiency of wet-end chemical additives. The relevant part of this document is the disclosure under the heading "Applications", specifically the subheading "Neutralizing anionic materials". In this part of the review there is no reference to the use of cationic starch. There is no motivation either in document D7 or in document D2 to combine these references.

It is true that on page 299 of document D7, cationic starch is literally mentioned, but this disclosure relates to the use of cationic starch - without any mention of a charge level for such starch - in a so-called dual retention system

together with a highly anionic retention aid. This disclosure is thus out of context.

For these reasons the prior art cited by the appellant cannot render obvious the subject-matter of claim 1 of the patent in suit.

Reasons for the Decision

1. The Board agrees with the parties that a charge state of 1.5 to 3.5 meqv/g of a cationised starch according to the patent in suit corresponds to a degree of substitution (DS) of 0.31 to 1.21, and that Posibarine C from Matsutani Kagaku used in Example 5 of document D6 has a slightly lower charge density than that of Raisamyl 135, ie slightly lower than 0.21 meqv/g.

2. *Amendments*

In view of the claim 1 as granted claim 1 has been amended in that the feature "the cationised starch being added before the stock starch and the retention agent" has been added. The Board considers that this feature was implicitly disclosed in the originally filed application for the following reasons:

On page 4, lines 30 to 34 of the originally filed application, it is stated that highly cationised starches as used in the invention function in the manner of alum or a poly-DADMAC chemical. The basic principle for adding such products is mentioned on page 3, lines 23 to 26 where it is stated that such products are added to the system at an early enough

stage to prevent binder substance particles, for instance, from forming harmful agglomerations (white pitch).

On page 4, lines 16 to 18 of the originally filed application the point immediately after the stock storage tank is mentioned as a typical point of dosage. This means that this is a typical but not the only possible point of adding agents for the removal of interference substances, such as alum and especially poly-DADMAC, in a papermaking process.

On page 5, lines 1 to 2 of the originally filed application, it is stated that the invention is described in the light of the following comparative examples, including retention tests.

On page 5, fourth paragraph of the originally filed application, retention tests to be conducted are referred to in a general way, as are also the various substances used. The sequence of addition of the various substances - which is in line with the sequence as disclosed in the above quoted description passages concerning the discussion of the prior art - is directly and unambiguously indicated in this paragraph. It is stated that firstly the interference removing agent is added to the stock, secondly the stock starch is added and finally the retention substance is added. Although in this paragraph a specific Dynamic Drainage Jar tester, the time interval allowing the added interference removing agent to the stock to mix and the time interval allowing the added retention substance to mix are mentioned, it is obvious to the skilled person that these parameters refer to the conditions under which the retention tests took place and therefore do

not belong to the production process itself. These parameters are important for the documentation and verification of the tests and the test-results but not for the production process. Also the reference to a specific retention substance in this paragraph is made in a facultative way, since this substance is mentioned only in brackets.

For these reasons the amendment in claim 1 of the patent in suit is not a generalisation over that which is directly and unambiguously derivable from the patent application as filed.

Therefore, the addition of the feature "the cationised starch being added before the stock starch and the retention agent" in the amendment to claim 1 as granted, which addition restricts the scope of protection of claim 1 as granted, does not contravene Article 123(2) and (3) EPC.

3. *Inventive step*

3.1 Closest prior art

The closest prior art is represented by document D6, which discloses a method for reducing the amount of interference substances in the water circulations of processes involving a web formation by dewatering of wood-based fibre suspensions, whereby at a stage preceding the web formation, a low-molecular cationising agent is added to the fibre suspension in order to adjust the zeta potential of the fibre suspension to -10 mV to +5 mV, the low-molecular cationising agent being added before the cationic auxiliaries.

Document D6 proposes the use of a number of different low-molecular cationising agents, one of which is cationic starch. In Example 5 of document D6 a cationic starch (Posibarine C) in an amount of 0.5% was added to the fibre suspension in order to improve the performance of a polyamidepolyamine-freeness improving agent.

3.2 Problem underlying the invention

The problem underlying the invention of the patent in suit is to provide a method for reducing the amount of interference substances in the water circulations of processes involving a web formation by dewatering of wood-based fibre suspensions, whereby the interference substances are effectively fixed to the fibres (see introductory part of the description and preamble of claim 1).

3.3 Solution

In accordance with claim 1 of the patent in suit the above mentioned problem is solved in that at a stage preceding the web formation, cationised starch having a charge state of 1.5-3.5 meqv/g is added to the fibre suspension in an amount of approximately 0.04 - 0.5% of the fibre dry matter in order to fix the interference substances from the water circulation to the fibres to be subjected to the web formation.

3.4 This solution is not rendered obvious by the documents under consideration for the following reasons:

The appellant argued that, if the person skilled in the art would like to improve the result obtained with the

cationic starch used in Example 5 of document D6, it would have been obvious to try a more effective cationic starch, ie a cationic starch with a higher charge state such as the highly cationic starch known from document D2, and in doing so the person skilled in the art would arrive at the method according to claim 1 of the patent in suit.

The Board however cannot agree to the view of the appellant.

Document D6 teaches that in order to reduce the negative effects of anionic trash in a neutral-papermaking method a suitable low-molecular cationising agent should be added to the fibre suspension before adding the cationic auxiliaries so that the zeta potential of the fibre suspension should be within a small range around the 0 mV zeta potential level. In document D6 ranges of -10 mV to + 5 mV and -7 mV to +2 mV are mentioned.

According to document D6 the selection of a suitable material for the low-molecular cationising agent and the added amount of said material are the two parameters biasing the zeta potential level of the fibre suspension. A suitable material can be selected out of a list of different cationic substances, one of which is cationic starch. An inorganic aluminium compound is recommended as an especially suitable cationising agent.

Document D6 is silent about the cationic charge state of the used low-molecular cationising agent.

Only the test results presented by the patentee during

the Opposition Proceedings, which were accepted by the other parties, showed that the starch used in Example 5 of document D6 is a low cationised starch.

Therefore, the person skilled in the art starting from Example 5 of document D6 where a low cationised starch is used and intending to ameliorate the achieved results bringing the zeta potential of the fibre suspension nearer to the 0 mV zeta potential level, finds in document D6 the instruction to either increase the amount of the added low cationised starch or to select another material as low-molecular cationising agent, for example an inorganic aluminium compound. Moreover, the person skilled in the art learns from the Examples 1 to 4 of document D6 that cationic substances other than cationic starch achieve better zeta-potential-values.

Therefore, the teaching of document D6 does not lead the person skilled in the art to concentrate his efforts for achieving a better zeta potential level on cationised starch and to experiment with the charge state of this agent.

Document D2 discloses the general and well known information (see document D2, first two lines of the last paragraph of page 1 and second paragraph of page 2) that highly substituted starch derivates are usable as a substance for improving the retention in the paper industry. However, there is no teaching in document D2 that a highly cationised starch having a cationic charge state being in the range claimed in claim 1 of the patent in suit when used in combination with other cationic auxiliaries would bring the zeta potential of the fibre suspension nearer to the ideal

zeta potential level of 0 mV as required according to the teaching of document D6.

Document D10 teaches that cationised starches having a degree of substitution of 0.02 to 0.06, ie a cationic charge state below the one claimed in claim 1 of the patent in suit are useful retention agents (see page 150, right hand column, third paragraph from below and last paragraph).

The Board cannot find in document D10 any hint that highly cationised starches as defined in claim 1 of the patent in suit produce a better retention effect than the low cationised starches recommended in this document.

The information disclosed in document D3 that a fixing agent is a type of retention aid is well known to the person skilled in the art and does not itself disclose an incentive for the skilled person to replace the starch of Example 5 of document D6 by a highly cationised starch having a cationic charge state in the range claimed in claim 1 of the patent in suit.

Document D7 is a general article relating to the removal of interference substances by using polyelectrolytes, allegedly having high cationic charge. However, this document is completely silent on the possible level of such a charge. The relevant part of this document is the disclosure under the heading "Applications", specifically the subheading "Neutralizing anionic materials". In this part of the review there is no reference to the use of cationic starch. It is true that on page 299 of document D7 the use of a cationic starch is mentioned. However, the

reference concerns a specific dual retention system, ie. a combination of an anionic retention aid and a cationic starch in order to improve the performance of this anionic retention aid. There is no teaching in document D7 for the use of a cationic starch having a charge state as defined in claim 1 of the patent in suit in order to bind interference substances from the water circulation to the fibres to be subjected to the web formation.

Therefore, the combination of either the teaching of document D6 or the teaching of document D7 with the teaching of document D2 together with the information disclosed in documents D10 and D3 (reflecting general technical knowledge) does not render obvious the subject-matter of claim 1 of the patent in suit.

3.5 For the above mentioned reasons, the subject-matter of claim 1 of the patent in suit involves an inventive step within the meaning of Article 56 EPC.

4. Dependent claim 2 is directed to an embodiment of the subject-matter of claim 1 and similarly involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Martinuzzi A. Burkhart