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D E C I S I O N
of 4 March 1997

Case Number: T 0374/93 - 3.3.1

Application Number: 87300471.7

Publication Number: 0235893

IPC: D21H 21/10

Language of the proceedings: EN

Title of invention:
Production of paper and paperboard

Patentee:
ALLIED COLLOIDS LIMITED

Opponent:
SNF Floerger

Headword:
Retention/ALLIED COLLOIDS

Relevant legal provisions:
EPC Art. 56, 123(2), (3)

Keyword:
"Extension beyond the content of the application as filed (no)
- deletion of inessential feature from a claim during examining
proceedings allowed"
"Inventive step (yes) - non-obvious solution"

Decisions cited:
T 0331/87, T 0060/90

Catchword:
-



Case Number: T 0374/93 - 3.3.1

DECISION
of the Technical Board of Appeal 3.3.1
of 4 March 1997

Appellant:
(Opponent)

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Appellant:
(Proprietor of the patent)

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office posted 18 February
1993 concerning maintenance of European patent
No. 0 235 893 in amended form.

Composition of the Board:

Chairman: A. J. Nuss
Members: J. M. Jonk
S. C. Perryman

Summary of Facts and Submissions

- I. The Patentee and the Opponent each lodged an appeal against the interlocutory decision of the Opposition Division by which the European patent No. 0 235 893 (European patent application No. 87 300 471.7) was maintained in amended form. Claim 1 of the patent in suit as granted read as follows:

"A process in which paper or paper board is made by forming an aqueous cellulosic suspension, passing the suspension through one or more shear stages selected from cleaning, mixing and pumping stages, draining the suspension to form a sheet and drying the sheet and in which the suspension that is drained includes organic polymeric material and inorganic material, characterised in that the inorganic material comprises bentonite which is added to the suspension after one of the said shear stages, and the organic polymeric material comprises a substantially linear cationic polymer having molecular weight above 500,000 which is added to the suspension before that shear stage in an amount which is at least 0.03% by weight based on the dry weight of the suspension and which is such that flocs are formed by the said addition of the polymer and the said flocs are broken by the shearing for form microflocs that resist further degradation by the shearing and that carry sufficient cationic charge to interact with the bentonite to give better retention than is obtainable when adding the polymer alone after the last point of high shear."

II. The opposition was based on Article 100(a), (b) and (c) EPC, and supported by several documents including:

(1) DE-A-2 262 906, and

(3) Tappi Journal/March 1983, Vol. 66, No. 3, 137-139.

III. The decision was based on Claims 1 to 15 of the auxiliary request as proposed during the oral proceedings before the Opposition Division on 1 July 1992 and as filed on 27 July 1992. Claim 1 of this set of claims read as follows:

"A process in which paper or paper board is made by forming an aqueous cellulosic suspension, passing the suspension through one or more shear stages selected from cleaning, mixing and pumping stages, draining the suspension to form a sheet and drying the sheet and in which the suspension that is drained includes organic polymeric material and inorganic material, characterised in that the inorganic material comprises bentonite which is added to the suspension after one of the said shear stages, and the organic polymeric material comprises a substantially linear cationic polymer having molecular weight above 500,000 which is added to the suspension before that shear stage in an amount which is at least 0.03% by weight based on the dry weight of the suspension, **when the suspension contains at least 0.5% cationic binder or above 0.06% when the suspension is free of cationic binder or contains cationic binder in an amount of not more than 0.5% and which is such that flocs are formed by the said addition of the polymer and the said flocs are broken by the shearing for form microflocs that resist**

further degradation by the shearing and that carry sufficient cationic charge to interact with the bentonite to give better retention than is obtainable when adding the polymer alone after the last point of high shear." (emphasis added)

IV. The Opposition Division held that the subject-matter of Claim 1 as granted did not meet the requirements of Article 123(2) EPC, since in accordance with the originally filed patent application the amount of cationic polymer had to be above 0.06% if the amount of cationic binder were smaller than 0.5%.

However, the Opposition Division also held that the subject-matter of the claims according to the auxiliary request met Article 123(2) EPC, was novel and involved an inventive step.

With respect to the issue of novelty they considered that none of the cited documents disclosed a process for producing paper and paper board in which a substantially linear synthetic cationic polymer having a molecular weight above 500,000 was added to the cellulosic suspension before one or more shear stages, and bentonite was added to the suspension after one of the said shear stages, whereby flocs as formed by the addition of the polymer were broken by shearing to form microflocs which resisted further degradation by shearing and carried sufficient cationic charge to interact with the bentonite to give better retention than was obtainable when adding the polymer after the last point of high shear.

Concerning inventive step the Opposition Division held that document (1) did not provide any incentive to apply the sequence of adding bentonite after the cationic polymer, and that the other cited documents concerned additives other than bentonite.

- V. Oral proceedings were held on 4 March 1997.
- VI. The Patentee argued that subject-matter in accordance with Claim 1 as granted met the requirements of Article 123(2) EPC, since the original application clearly indicated that the amount of cationic polymer was normally above 0.03%, and that optimum amounts of said component depended on the composition of the stock and could easily be determined experimentally.

The Opponent argued in reply that a broadening of a claim would be allowable if an inconsistency between that claim and the description was to be eliminated, and if there was a clear basis in the original disclosure for said amendment. However, in the present case, the subject-matter of Claim 1 of the originally filed patent application was completely consistent with the original description, whereas Claim 1 as granted defining the amount of cationic polymer to be added in a functional way was not supported by the original description, since in accordance with said description the amount of cationic polymer had to be at least 0.06% if the stock was free of cationic binder or only contained a small amount of it.

After deliberation by the Board, the Chairman informed the parties that the Board had no objections against the subject-matter of Claim 1 as granted under Article 123(2) EPC.

- VII. However, regarding the issue of inventive step to be discussed, the Board observed that, in view of the written submissions of the parties and the teaching of the application as filed, the addition of the bentonite after the last point of high shear appeared to be an essential feature of the claimed invention.

VIII. In response, the Patentee filed during the oral proceedings new Claims 1 to 15. Claim 1 of this set of claims read as follows:

"A process in which paper or paper board is made by forming an aqueous cellulosic suspension, passing the suspension through one or more **high** shear stages selected from cleaning, mixing and pumping stages, draining the suspension to form a sheet and drying the sheet and in which the suspension that is drained includes organic polymeric material and inorganic material, characterised in that the inorganic material comprises bentonite which is added to the suspension after one of the said shear stages, and the organic polymeric material comprises a substantially linear cationic polymer having molecular weight above 500,000 which is added to the suspension before that shear stage in an amount which is at least 0.03% by weight based on the dry weight of the suspension and which is such that flocs are formed by the said addition of the polymer and the said flocs are broken by the shearing for form microflocs that resist further degradation by the shearing and that carry sufficient cationic charge to interact with the bentonite to give better retention than is obtainable when adding the polymer after the last point of high shear, **and in which the said high molecular weight polymer is added before the last point of high shear and the said bentonite is added after the last point of high shear.**" (emphasis added in order to indicate the deviations with respect to Claim 1 as granted)

IX. With respect to this new set of claims, the Opponent withdrew his novelty objection which was based on document (1).

However, he essentially argued that the claimed subject-matter did not involve an inventive step in the light of document (3) in combination with document

(20) US-A-3 052 595.

In this context, he argued that document (3) disclosed the addition of a filler after the addition of a retention agent in order to improve the filler retention. Moreover, in reading this document, a skilled person would immediately understand that not only kaolin could be used as a filler, but also other conventional fillers such as bentonite. In support of his submission that bentonite was a conventional filler in paper making, he referred to document

(11) US-A-4 305 781, and

a Declaration by Prof. Dr. Knut Nitzl as filed by the Opponent on 4 February 1997.

In addition, the Opponent argued that document (3) suggested that the system as disclosed therein could be optimised by using the technique of dual retention aids, such as by adding an anionic aid. Therefore, document (3) also provided an incentive to the skilled person to consider the teaching of document (20), which was related to such a technique of dual retention and disclosed the incorporation of a small proportion of bentonite clay in the filler in order to enhance the activity of the acrylamide polymer for improving filler retention.

- X. The Patentee argued that the cited documents, alone or, in combination, did not suggest that in accordance with the process as claimed improved dewatering performance could be obtained.

In particular, he argued that document (1) by disclosing the opposite order of addition of polymer and bentonite rather directed away from the claimed invention.

Concerning document (3), the Patentee accepted that this document could be considered as the closest state of the art. However, this document did not suggest the use of bentonite. In this context, he argued that kaolin and bentonite did not show similar properties, and were used for different purposes and in different amounts. In support, he referred to a Declaration by Mr. Leo Neimo filed on 4 February 1997. Moreover, he disputed that document (3) provided a link with prior art as disclosed in document (20).

Even if the teaching of said document (20) would be combined with that of document (3), the skilled person would not arrive at the claimed invention, since document (20) only described the use of anionic or nonionic acrylamide polymers and clearly indicated that it was preferred to add the bentonite prior to the acrylamide polymer.

Furthermore, the Patentee filed on 4 February 1997 a test report in order to show the advantages of using bentonite compared with kaolin as applied in Document (3). In this respect, he also referred to the examples of the patent in suit.

XI. The Opponent requested that the decision under appeal be set aside, and that the patent in suit be revoked.

The Patentee requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of Claims 1 to 15 as submitted at the oral proceedings on 4 March 1997.

XIII. At the conclusion of the oral proceedings the Board's decision was pronounced.

Reasons for the Decision

1. Both appeals are admissible.
2. The first issue to be dealt with is whether or not the replacement of the amount of cationic polymer to be added to the suspension as defined in the originally filed Claim 1, i.e.

"an amount of above about 0.03%, based on the dry weight of the suspension, when the suspension contains at least about 0.5% cationic binder or above about 0.06% when the suspension is free of cationic binder or contains cationic binder in an amount of not more than about 0.5%",

by the functional feature as defined in present Claim 1, as well as in the Claim 1 as granted, reading:

"an amount which is at least 0.03% by weight based on the dry weight of the suspension and which is such that flocs are formed by the said addition of the polymer and the said flocs are broken by the shearing for form microflocs that resist further degradation by the shearing and that carry sufficient cationic charge to interact with the bentonite to give better retention than is obtainable when adding the polymer alone after the last point of high shear"

is allowable under Article 123(2) EPC.

2.1 In accordance with the established case law of the Boards of Appeal, an amendment in a claim during proceedings before the Examining Division is permissible under Article 123(2) EPC if it does not introduce anything which is novel when compared with the application as filed, or - in other words - so long as a person skilled in the art, having regard to his common general knowledge, would immediately and unambiguously derive the subject-matter of said amendment from the content of the application as originally filed.

2.2 In the present case, the specification of the originally filed patent application discloses

- that the amount of cationic polymer used in **conventional processes** as retention aid, in the substantial absence of cationic binder, is **typically between 0.01 and 0.05%** (dry polymer based on dry weight of paper) (see page 17, lines 6 to 10);
- that in **these conventional processes** no **significant shear** is applied to the suspension **after adding the polymer**;
- that the **optimum amount in conventional processes** is at or just below the level that gives optimum retention and that this amount **can easily be determined by routine experimentation by the skilled mill operator** (see page 17, lines 21 to 25);

- that according to the invention an excess amount of cationic polymer, generally 1.1 to 10 times, usually 3 to 6 times, the amount that would have been regarded as optimum in conventional processes is used (see page 17, lines 26 to 29);
- that the amount will therefore normally always be above 0.03% (see page 17, lines 29 and 30);
- that the use of the excess amount of cationic polymer is thought to be necessary to ensure that the shearing that occurs in the centriscreen or other shear stage results in the formation of microflocs which contain or carry sufficient cationic polymer to render parts at least of their surfaces sufficiently cationically charged (see page 18, lines 14 to 20);
- that whether or not a sufficient excess of cationic polymer has been added (and presumably whether or not the resultant microflocs do have a sufficient cationic charge) can easily be determined experimentally by plotting the performance properties in the process, with a fixed amount of bentonite and a fixed degree of shearing, at various levels of polymer addition (see page 18, line 34, to page 19, line 3); and
- that the retention and other properties are relatively poor when the amount of cationic polymer is insufficient, e.g. the amount typically used in the prior art (see page 18, lines 3 to 6).

Moreover, as submitted by the Patentee and not disputed by the Opponent, a skilled person in reading the original specification would immediately and unambiguously understand that an optimum amount of

cationic polymer would always depend on parameters such as the nature of the stock, which may contain other additives including a cationic binder (see also page 15, lines 14 to 22, of the original specification).

Therefore, in the Board's judgment, the feature in question, which defines in functional terms the amount of cationic polymer to be added so that flocs are formed, said flocs are broken by shearing to form microflocs, said microflocs resist further degradation by shearing and carry sufficient cationic charge to interact with the bentonite, and thereby a better retention is achieved than is obtainable when adding the polymer alone after the last point of high shear, is clearly supported by the original description.

- 2.3 In this context the Board observes that, in accordance with the established case law of the Boards of Appeal, the present functional feature is also considered as allowable under Article 84 EPC, since - as indicated above - the amount of polymer to be added depends on a variety of parameters such as the nature of the stock, the cationic charge of the polymer, and the nature (cationic charge) of the polymer, so that it cannot otherwise be defined more precisely without restricting the scope of the invention, and because the present functional feature provides instructions which are sufficiently clear for the skilled person to reduce them to practice without undue burden, if necessary with reasonable experiments.

2.4 The Opponent argued that the amount of polymer to be added to the suspension as defined in Claim 1 of the original application was an essential feature, and that the deletion of this feature was not allowable under Article 123(2) EPC. In this respect, he referred to a passage in the description as originally filed (page 17, line 31, to page 18, line 2) reading:

"The amount will therefore normally always be above 0.03% (0.3 k/t) and **in some instances** adequate results can be achieved **with dosages as low as this** if the stock to which the polymer is added already contains a **substantial amount, e.g., 0.5%**, cationic binder. However if the stock is free of cationic binder or only contains a **small amount** then the dosage of polymer will **normally** have to be more, **usually** at least 0.06% (0.6 k/t)" (emphasises by bolds and underline added).

2.5 An amendment of a claim by deleting or replacing a technical feature is considered as allowable by the boards of appeal provided a person skilled in the art would directly and unambiguously recognise that the deleted or replaced feature was not essential for the function of the invention as disclosed in the original application (see T 331/90, OJ 1991, 22; and T 60/90 of 11 December 1992 (not published in OJ EPO)).

2.6 In the present case, the original application as a whole - as indicated above - unambiguously teaches that the amount of cationic polymer to be added to the suspension depends on various parameters and can easily be experimentally determined. Therefore, a person skilled in the art would interpret said passage in the light of the original specification as a whole, in the Board's judgment, as an instruction to facilitate the finding of the optimum amount of cationic polymer, or as an advantageous embodiment of the originally

disclosed invention. In view of these considerations, the deleted feature of the originally filed Claim 1 suggesting the need of stepwise raising of the amount of polymer to be added if the amount of cationic binder would be reduced from a value just above 0.5% to a value just below said value, rather appears to be inconsistent with the teaching of the original application. In any case, in the Board's view, the skilled reader would not immediately and unambiguously recognise from said passage containing several relative terms and expressions such as "in some instances", "e.g.", "normally" and "usually", that the feature as deleted from the original Claim 1 was a mandatory feature.

2.7 Furthermore, the amendments in Claim 1 as granted, i.e. the replacement of "shear stages" in the precharacterising part of the claim by "high shear stages" and the incorporation into the claim of the feature that the polymer is added before the last point of high shear and the bentonite is added after said point, are based on page 12, line 29, to page 13, line 9; page 13, lines 23 to 27; page 14, lines 5 to 16; and Claim 3 of the originally filed patent application, and on page 5, lines 34 to 39, 49 to 51, and 58 to 64; and Claim 3 of the patent in suit. In addition, the Board observes that these amendments are clearly limiting features, so that they do not contravene Article 123(3) EPC either.

2.8 Therefore, the Board concludes that the present claims comply with the requirements of Article 123 EPC.

3. After examination of the cited prior art, the Board has reached the conclusion that the subject-matter as defined in all claims is novel. Since after the limitation of Claim 1 as granted novelty was not disputed anymore, it is not necessary to give reasons for this finding.

4. The remaining issue to be dealt with is whether the subject-matter of the present claims involves an inventive step.
 - 4.1 The Board considers, in agreement with the parties, that the closest state of the art with respect to the composition according to present Claim 1 is the disclosure of document (3).

Document (3) describes that the first pass filler retention in a paper making process is higher when a cationic polymer is added to the stock before the filler is added, no matter which of several fillers are used (see page 137, middle column, first paragraph, Table I, and Figure 1; and page 138, middle column, second paragraph, and Figure 5, run 2). It also describes, that by subjecting stock and retention aid to shearing by way of a fan pump before the filler is added, about the same retention and in addition a good formation is achieved (see the abstract on page 137; Figure 5, runs 3 and 4; and page 138, middle column, second paragraph, to page 139, line 2). As suitable fillers kaolin and/or titanium dioxide are mentioned (see Figures 1 to 3, and Table 1). Consequently, the process according to document (3) differs from the process of present Claim 1 of the patent in suit in that it does not comprise the use of bentonite.

Regarding this prior art the Patentee argued on the basis of experimental results that by using the process according to the claimed invention in particular an improved retention and drainage effect, and in addition a good paper strength is achieved.

4.2 Therefore, in the light of this closest prior art, the Board sees the technical problem underlying the patent in suit as the provision of a process for the production of paper or paper board providing an enhanced retention and drainage, and at the same time a good paper strength (see also page 4, lines 52 to 62, of the patent in suit).

4.3 The patent in suit suggests, as the solution to this problem, a process according to Claim 1, which essentially comprises the addition of bentonite after the last point of high shear.

4.4 In view of the Examples 7 and 11 of the patent in suit and the Patentee's test report of 4 February 1997 the Board is, on the balance of probabilities, satisfied that the above technical problem is solved.

Example 7 of the patent in suit shows that the use of bentonite in an amount of 0.1% provides a retention value of 205 (B/W Solids) and a drainage time of 5 sec. (see test 4), whereas the same amount of clay, calcium carbonate and titanium dioxide gives retention values of 710, 700 and 740 respectively, and a drainage time of each 25 sec. (see tests 6, 7 and 8). In addition, it indicates that better dewatering properties could be obtained by increasing the amount of clay, calcium carbonate and titanium dioxide, but that in doing so the sheet strength would be reduced. In this respect,

Example 11 of the patent in suit shows that by using 20% china clay and 0.2% bentonite after the last high shear stage about the same retention is achieved, but that by using the high amount of clay the burst strength is halved.

Furthermore, these test-results are confirmed by the test report as submitted on 4 February 1997 showing that bentonite provides clearly better drainage and retention effects than kaolin (see in particular Figures 3, 6, 7 and 10, obtained by using the conditions as indicated on page 3, last paragraph).

In this context, the Board also notes that during oral proceedings the Opponent did not dispute the existence of said advantages anymore.

4.5 It remains to be decided, whether the requirement of inventive step is met by the claimed process.

4.6 As indicated above (see point 4.2, second paragraph), the paper making process as described in document (3) corresponds to the process as claimed in the patent in suit except that in accordance with the prior art process kaolin and/or titanium dioxide are added.

Having regard to the teaching of this document that white water consistency was lower when retention aid was added first, no matter which of several fillers was used (see page 137, middle column, first paragraph, last sentence), the Opponent submitted that the use of bentonite was obvious, since bentonite was a usual filler. However, apart from the question whether or not bentonite could be considered as a conventional filler, (which was denied by the Patentee), in the Board's judgment, document (3) does not give any pointer to the

skilled person that the technical problem underlying the patent in suit as defined above could be solved by the addition of bentonite after the last point of high shear in accordance with present Claim 1.

In this context, the Board observes that according to the established jurisprudence of the boards of appeal for determining lack of inventive step, it is necessary to show that considering the teaching of the relevant documents as a whole, without using hindsight based on the knowledge of the claimed invention, the skilled person would have arrived at the **claimed solution of the technical problem to be solved**. However, as indicated above, a skilled person, when trying to solve the technical problem underlying the patent in suit, would not have any reason to replace the fillers mentioned in document (3), let alone to replace them by bentonite.

- 4.7 Document (20) relates to a method for increasing filler retention in paper manufacture. In particular, it discloses that the incorporation of small amounts of high molecular weight acrylamide polymer in mixtures of paper pulp and mineral filler gives an enhanced retention of the filler (see column 1, lines 24 to 29). The acrylamide polymer is thereby incorporated with the paper pulp in the form of a dilute aqueous solution either before or after the addition of fillers (see column 2, lines 17 to 26; and Examples 1 and 6). In addition, this document discloses that it has also been found that the inclusion of a small proportion of bentonite clay in the filler further enhances the activity of the acrylamide polymer (see column 1, lines 29 to 32). However, according to that preferred embodiment, it is in any case preferred that the bentonite be admixed with the pulp in the form of an aqueous slurry and be dispersed in the pulp-filler

mixture prior to the addition of the acrylamide polymer (see column 2, line 56, to column 3, line 8; the flow sheet in column 1, lines 37 to 59; and the Examples 2 to 5). Furthermore, as suitable acrylamide polymers only anionic and nonionic polymers are mentioned (see column 2, line 60, to column 3, line 7). Therefore, in the Board's judgment, document (20) does not give any incentive to the skilled person to the solution of the technical problem underlying the patent in suit as claimed, since it does not suggest the use of a cationic polymer and also points rather away from the claimed invention by indicating that the bentonite should be added prior to the addition of the polymer.

- 4.8 Even if the skilled person - as submitted by the Opponent - would read the teaching of document (20) in the light of the disclosure of the later published document (3) indicating a reversed order of addition of "filler" and polymer, this resulting teaching, in the Board's view, does not unambiguously give the skilled person an incentive to add the bentonite after the addition of the polymer, since according to document (20) the bentonite is used as a "retention aid" in addition to conventional fillers, i.e. not as a conventional filler (see column 2, lines 45 to 55; and Examples 2 to 5). In any case, the skilled person would have been left with technical information which does not suggest the use of a cationic polymer. In this context the Board observes that according to the patent in suit the use of a cationic polymer is an essential feature of the claimed process as shown, e.g. by Example 10 of the patent in suit, in particular by the results of test 3 compared with tests 14 (using a nonionic polymer) and 15 (using an anionic polymer) as indicated in Table 8).

4.9 Document (1) discloses a process for the production of paper using bentonite in order to prevent the reduction of the dewatering properties of certain polymers, such as cationic polyethylene imines falling under the scope of present Claim 1 of the patent in suit, by the presence of impurities which make these polymers less effective (see page 1, first paragraph; page 4, last paragraph, to page 5, second paragraph; and Claim 1). The polymers are added in the usual manner, i.e. shortly before the forming of the paper web (see page 5, last paragraph). Therefore, in the Board's judgment, also this document does not give any pointer to the skilled person that the technical problem underlying the patent in suit could be solved by adding the bentonite after the addition of the polymeric retention aid and after the last point of high shear.

4.10 In conclusion, the Board finds that the process according to present Claim 1 involves an inventive step in the sense of Article 56 EPC.

Since Claims 2 to 15 relate to particular embodiments of the compositions claimed in Claim 1, they are also allowable.

Order

For these reasons it is decided that:

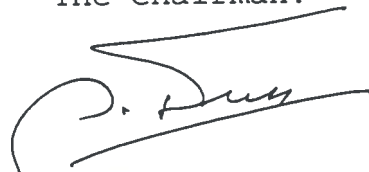
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the set of claims submitted at the oral proceedings on 4 March 1997, and a description to be adapted.

The Registrar:



E. Gorgmajer

The Chairman:



A. Nuss