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D E C I S I O N
of 14 January 2004

Case Number: T 0672/01 - 3.3.6

Application Number: 94919951.7

Publication Number: 0705365

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Language of the proceedings: EN

Title of invention:

Defibered fluff pulp and method for its preparation

Patentee:

STORA KOPPARBERGS BERGSLAGS AKTIEBOLAG

Opponent:

Procter & Gamble Company

Headword:

Fluff pulp/STORA

Relevant legal provisions:

EPC Art. 123(2), 84, 83, 54, 56

Keyword:

"Inventive step (all requests) - no"

Decisions cited:

-

Catchword:

-



Case Number: T 0672/01 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 14 January 2004

Appellant: STORA KOPPARBERGS BERGSLAGS AKTIEBOLAG
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 11 April 2001
revoking European patent No. 0705365 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: P. Krasa
Members: G. Dischinger-Höppler
C. Rennie-Smith

Summary of Facts and Submissions

- I. This appeal is from the decision of the Opposition Division to revoke European patent No. 0 705 365 relating to defibered fluff pulp and a method for its preparation. The decision was based on the claims as granted as a main request and on amended sets of claims according to two auxiliary requests.
- II. In its notice of opposition filed against the patent, the Respondent (Opponent) sought revocation of the patent on the grounds of Article 100(b) EPC for insufficient disclosure and on the grounds of Article 100(a) EPC for lack of novelty and lack of inventive step (Articles 52(1), 54(2) and 56 EPC). The opposition was based inter alia on the following documents
- D3 US-A-4 853 086 and
- D4 US-A-4 888 093.
- III. In its decision, the Opposition Division found that the subject-matter of granted Claims 1, 20 and 29 was not novel and the subject-matter claimed in the two auxiliary requests was not inventive. The assessment of inventive step was based on the disclosures of D4 and D3.
- IV. This decision was appealed by the Appellant (Proprietor) who, in response to the Board's communication annexed to the summons for oral proceedings, filed amended sets of claims in a new main request and nine auxiliary requests.

V. Oral proceedings before the Board of Appeal were held on 14 January 2004, in the course of which the Appellant replaced its former requests by a new main and eight auxiliary requests. Of those requests only auxiliary requests IV and V were eventually maintained as the Appellant's ultimate main request and single auxiliary request I.

Claim 1 of the main request reads:

"1. Defibrated fluff pulp containing crosslinked cellulose fibres, having good compressibility under the influence of heat and pressure, characterized in that the fluff pulp has a fibre structure obtainable by (i) impregnating the fibres with a crosslinking agent and at least one bifunctional, trifunctional or polyfunctional alcohol, which bifunctional, trifunctional or polyfunctional alcohol does not contain a functional group of the aldehyde, keto or carboxyl type, (ii) drying the fibres, (iii) defibrating the pulp, and (iv) crosslinking the fibres of the defibrated pulp at a temperature of between greater than 120°C and 210°C.

Claim 1 of the auxiliary request differs therefrom only in that step (ii) reads:

"(ii) drying the fibres to a dry matter content of at least 80%,".

VI. With respect to those remaining requests, the Appellant's arguments were in summary:

- The claimed subject-matter was inventive in view of D4 as the closest prior art since there was no hint in the prior art that the addition of a bi-, tri- or polyfunctional alcohol might give products having properties similar to those obtained in D4, let alone improved compressibility and decreased resilience at retained absorption capacity.

- A skilled person would not combine the teaching of D4 relating to crosslinked cellulose fibres with that of D3 since the latter taught to use, for the purpose of achieving high resilience, temperatures not higher than 100°C where crosslinking would not occur.

- Even a combination of D4 and D3 would not result in the claimed subject-matter since the alcohol applied in an aqueous solution and at temperatures according to D3 would not become involved in the crosslinking reaction disclosed in document (4).

VII. The Respondent submitted in summary the following arguments:

- The disclaimer introduced into Claim 1 violated Article 123(2) EPC since the exclusion of alcohols having aldehyde, keto or carboxyl groups had no basis in the application as filed.

- The claimed subject-matter was insufficiently disclosed with respect to the alcohols to be selected in order to arrive at the desired product. It was further unclear as far as the drying step was concerned.

- The claimed subject-matter was not inventive over D4 when combined with the disclosure of D3.

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of either the main request or the auxiliary request I, both filed during oral proceedings.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

Main request

1. *Amendments (Articles 123 and 84) and sufficiency of disclosure (Article 100(b) EPC)*
 - 1.1 The Board is satisfied that the amendments made to the claims are allowable within the requirements set out in Articles 123 and 84 EPC.
 - 1.1.1 The feature objected to by the Respondent under Article 123(2) EPC "which bifunctional, trifunctional or polyfunctional alcohol does not contain a functional group of the aldehyde, keto or carboxyl type" is based on the original Claim 8 and corresponding description on page 6, lines 4 to 9 according to which it represents a particular modification of the subject-matter of original Claim 1 in respect of the bi-, tri- or polyfunctional alcohol to be used. The feature, therefore, represents a disclaimer based on the original disclosure by limiting the formerly unlimited

group of bi-, tri- or polyfunctional alcohols to those not containing the particular group of alcohols defined in original dependent Claim 8.

1.1.2 Concerning the objection under Article 84 EPC, the Board agrees that the term "drying the fibres" might be vague and unsuitable to define clearly the subject-matter in regard to any particular extent of drying. However, the term was already present in the claims as granted and is not the outcome of the amendments made. Therefore, no problem under Article 84 EPC was created by the amendment.

1.2 The Board is further satisfied that the patent in suit discloses the invention in a manner sufficiently clear and complete as required in Article 100(b) EPC for the following reasons:

The subject-matter of Claim 1 relates to a compressible defibrated fluff pulp containing crosslinked cellulose fibres. In a variety of examples of the patent in suit it is shown how this subject-matter can be obtained by using different alcohols (Tables to 6). Hence, the Respondent's objection that the patent in suit did not disclose which alcohol gave the desired product is clearly unsustainable.

1.3 Since the appeal fails for other reasons, no further comments on these matters are necessary.

2. *Novelty*

The Respondent explicitly accepted novelty of the claimed subject-matter. Whilst some reservations might

remain in respect of this issue, it is not necessary to decide it since the appeal fails for lack of inventive step.

3. *Inventive step*

3.1 The patent in suit relates to a defibrated fluff pulp containing crosslinked cellulose fibres suitable for the manufacture of absorbent hygiene products such as nappies or sanitary towels (page 2, lines 5 to 16). In particular, it is intended to provide a defibrated fluff pulp having **improved**, preferably controllable, compressibility but which still possesses good absorption properties (page 2, lines 41 to 47).

3.2 The parties agreed that D4 should be considered as the closest prior art. This document is also concerned with defibrated crosslinked cellulose fibres useful for absorbent articles like tissue sheets of diapers (column 18, lines 19 to 24). Therefore, the Board agrees that D4 qualifies as a suitable starting point for assessing inventive step.

3.3 In order to produce such fibres, D4 suggests two different processes, the first one being a dry cross-linking process wherein the following steps are carried out in succession:

- (i) soaking the fibres in an aqueous solution containing the crosslinking agent to assure impregnation of the fibres (column 7, line 61 to column 8, line 11);

- (ii) drying the fibres (column 8, line 57 to column 9, line 2);
- (iii) defibrating the fibres into a "fluff" prior to reaction of the crosslinking agent (column 8, line 65 to column 9, line 14 and column 6, lines 17 to 20) and
- (iv) heating the defibrated fibres to a temperature suitable to cause their crosslinking (column 9, lines 15 to 18), without, however, maintaining temperatures in excess of 160°C in order to avoid yellowing or other damaging of the fibre (column 9, lines 11 to 13 and 36 to 40).

This process is illustrated by Example 1 where a curing temperature of 145°C is used for crosslinking (column 22, lines 24 to 25).

In the second process disclosed in D4 the crosslinking is carried out in a nonaqueous solution. This process differs from the first one in that the fibres are first defibrated, then dried, and thereafter contacted with a solution crosslinking agent in a nonaqueous diluent containing less than 18% of water to carry out crosslinking at about ambient temperatures (column 10, lines 59 to 63, column 12, lines 1 to 44 and Example 6).

3.4 D4 does not disclose the addition of at least one bi-, tri- or polyfunctional alcohol to the impregnation solution. Therefore, any difference between the subject-matter of Claim 1, as far as it relates to those fluff pulp embodiments whose fibre structure is

obtained by the process steps defined in product Claim 1, and the products obtained by the above dry crosslinking process of D4, can be attributed to this addition of an alcohol.

Alternatively, the nonaqueous solution crosslinking process of D4 might result in products being distinguished not only via the absence of alcohol but also via the other distinguishing process steps.

The Appellant argued that the products obtained by the nonaqueous solution crosslinking process were more comparable to the claimed product since they included the crosslinking of the fibres while being swollen by the nonaqueous diluent. This was comparable to the crosslinking in the presence of a polyfunctional alcohol according to Claim 1, whereas in a dry crosslinking process the fibres were crosslinked while being in a non-swollen or collapsed state.

However, as admitted by the Appellant, swelling of the fibres may also be due to the presence of water and according to the dry crosslinking process of D4 considerable amounts of water are also left in the fibres after drying to a consistency of between 40 and 60% (column 8, lines 60 to 65 and Example 1, column 22, lines 19 to 22). Therefore, if any distinction between the products can be made by means of their swelling state during crosslinking, it is definitely dependent on the degree of swelling or, in other words, on the amount of swelling agent contained in the fibre. Since the claimed subject-matter is not limited in this respect, it is not apparent that the claimed product had more similarity with the product obtained by the

nonaqueous solution crosslinking process of D4 than with that of the dry crosslinking process. On the other hand, the latter process is closer to the process by which the claimed product may be obtained, differing only by the absence of alcohol.

Therefore, the Board holds that the products obtained by the dry-crosslinking process of D4 are the most suitable starting point for assessing inventive step of the subject-matter of Claim 1.

3.5 Examples illustrating the claimed subject-matter are given in the patent in suit in four experimental series. However, experimental series No. 1 shows that improved compressibility does not necessarily result from the features of Claim 1. In particular, samples 1:4:C and 1:5:C, whilst treated in accordance with the process steps in product Claim 1, give worse compressibility, expressed as relative density, when measured under the same conditions (temperature and pressure) as the corresponding sample 1:0:C representing the products obtained in the absence of any alcohol, hence products according to D4.

Therefore, in view of D4 the technical problem of improving compressibility stated in the patent in suit (see 3.1 above) is not solved for some embodiments covered by the subject-matter of Claim 1.

The Appellant conceded that for those embodiments the technical problem in view of D4 was less ambitious and was to provide an alternative absorbent product having similar good properties. Table 2 actually records for the samples 1:4:C and 1:5:C values similar to, but

slightly lower than those given for sample 1:0:C for the wet specific volume (8.16 and 8.53 versus 8.72 dm³/kg at 2.5 kPa), the absorption capacity (7.82 and 8.32 versus 8.38 g/g) and the relative density (93 and 95 versus 100%).

The Board, therefore, accepts that in view of D4 the technical problem of providing an alternative fluff pulp is actually solved by the means set out in Claim 1.

3.6 It remains to be decided whether, in view of the available prior art documents, it was obvious for someone skilled in the art to solve this technical problem by the means claimed namely, by comparison with the dry crosslinking process of D4, by obtaining the fibres by impregnation with an aqueous solution containing not only the crosslinking agent but also a bi-, tri- or polyfunctional alcohol.

3.7 Treatment of fibrous cellulosic material with a bifunctional alcohol and a crosslinking agent is known from D3. This document relates to the same technical field as D4 or the patent in suit, i.e. fibrous cellulose-based fluff having increased water absorptivity and water holding capacity useful for making sanitary articles like diapers and napkins (column 1, lines 6 to 13). In order to produce such fluff, it discloses a process in which a fibrous web is impregnated with an aqueous solution of a glycol (i.e. bifunctional alcohol) and a dialdehyde (i.e. a chemical useful as crosslinking agent in D4 and the patent in suit; see in D4, column 3, lines 62 to 64, in the patent, page 4, lines 36 to 39). The web is then dried,

defibrated and air felted into the desired absorbent fluff product (column 3, lines 15 to 39 and Claim 1). It is emphasised that during the drying step temperatures should not exceed 100°C in order to maintain normal production capability on conventional papermaking equipment and to avoid embrittlement and discoloration of the fibres (column 2, lines 39 to 59 and column 3, lines 40 to 48).

3.8 The Appellant argued that due to the low temperatures used in D3 no crosslinking of the fibres would occur. Therefore, neither would a skilled person combine the disclosures of D3 and D4 nor would a combination result in the claimed subject-matter. Moreover, there was no hint in the art that products similar to those of D4 can still be achieved despite the addition of alcohol. Consequently, there was no reason for those skilled in the art to use the bifunctional alcohol of D3 in the process of D4.

3.9 In fact, D3 does not mention a separate crosslinking step. On the contrary, it is stated that it was scientifically unclear whether chemicals like dimethylolurea and glyoxal (a dialdehyde) actually serve as crosslinking agents within the fibres (column 3, lines 4 to 8). Nevertheless, it is assumed in D3 that glycol is especially effective in increasing the absorbency rate of a fluff product and that the dialdehyde may serve, though the exact mechanism was unknown, to chemically link the glycol to the cellulose fibre (column 4, lines 20 to 24). Thus, D3 teaches that the absorption rate of fluff pulp can be increased by impregnation with glycol and dialdehyde.

3.10 The Appellant's argument, that those skilled in the art would not consider D3 since its teaching led away from using temperatures high enough for crosslinking, is not convincing since D3 acknowledges that crosslinked pulps have advantages, but that the disadvantage was the high temperature required for curing.

One of the reasons given in D3 for using temperatures not exceeding 100°C is exactly the same as that given in D4 for using curing temperatures below 160°C, namely to avoid yellowing and embrittlement or damaging of the fibres (D3, column 3, lines 40 to 45; D4, column 9, lines 36 to 40). Given the contradictory statements in D3 and D4 as to the temperature limit for avoiding such damaging, a person skilled in the art would, however, try both approaches in order to find out under what conditions still useful products can be achieved.

The other reason given in D3 is that the application of temperatures above 100°C was unfeasible without a major loss in production capability (column 2, lines 43 to 56). However, this disadvantage is not part of the technical problem to be overcome and is obviously accepted in the patent in suit as it is in D4. It follows that a skilled person confronted with the technical problem as hereinbefore defined would have also considered D3.

Therefore, in order to provide alternative products to those obtained in D4, a skilled person would follow the process principles disclosed in D4 as far as possible. Considering that according to D3 impregnation of the fibres with an aqueous solution containing not only a dialdehyde (the crosslinking agent used in D4) but also

glycol (a bifunctional alcohol) can improve the absorption rate of the final fibrous fluff, it was obvious for a person skilled in the art to try the same impregnation treatment in the process of D4 in the expectation that the properties of the product would, at least, not worsen unduly.

- 3.11 The Board, therefore, concludes that for the purpose of providing an alternative product to the fluff pulp produced in accordance with the dry crosslinking process of D4, a skilled person would, with a reasonable expectation of success, have added a bifunctional alcohol in step (i) of D4 mentioned above under 3.3, thereby arriving at the claimed subject-matter.

Consequently, the Appellant's main request must fail since the subject-matter of Claim 1 is not based on an inventive step as required by Articles 52(1) and 56 EPC.

Auxiliary request

4. Claim 1 differs from that of the main request only in that it contains the feature "to a dry matter content of at least 80%" in step (ii) which finds basis in the application as filed (page 6, lines 34 to 37; see also the patent in suit, page 4, lines 47 to 49). Although the Board has reservations under Article 84 EPC with regard to the admissibility of the introduction of that term into Claim 1, since the term "dry matter" is undefined in the patent in suit and may for instance include or exclude dry polyalcohol, it is not necessary to give details in this respect, since in the absence

of evidence showing that the particular dry matter content has any influence on the product properties, the same reasons given for lack of inventive step of Claim 1 of the main request also apply to Claim 1 of the auxiliary request.

This has been admitted by the Appellant who conceded that the term was introduced merely as a clarifying definition of the drying conditions in step (ii) of Claim 1 which did not have an impact on the assessment of inventive step.

5. Therefore, the Appellant's auxiliary request must also fail since it too does not meet the requirements of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:

G. Rauh

P. Krasa