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D E C I S I O N
of 20 October 1997

Case Number: T 0112/94 - 3.2.2

Application Number: 86302696.9

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IPC: A61F 13/46

Language of the proceedings: EN

Title of invention:
Absorbent structures

Patentee:
The Procter & Gamble Company, et al

Opponent:
VP- Schickedanz AG
Mölnlycke Absorbent Products Supply AB

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
T 0511/92, T 0565/92

Catchword:
-



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Boards of Appeal

Chambres de recours

Case Number: T 0112/94 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 20 October 1997

Appellant:
(Opponent 02)

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office posted 21 December
1993 concerning maintenance of European patent
No. 0 198 683 in amended form.

Composition of the Board:

Chairman: M. Noël
Members: M. Bidet
C. Holtz

Summary of Facts and Submissions

I. European patent No. 0 198 683 was granted with effect from 11 December 1991 on the basis of the European patent application No. 86 302 696.9 claiming a priority date of 15 April 1985.

II. Two oppositions were filed against the grant of the patent on the grounds of lack of inventive step (Articles 100(a), 52 and 56 EPC).

III. The reason given for the decision was that the grounds for opposition mentioned in Article 100(a) EPC did not prejudice the maintenance of the patent as amended according to the auxiliary request filed at the oral proceedings on 11 November 1993, having regard to the following documents:

D1: US-A-4 186 165

D2: EP-A-0 108 637

D3: EP-A-0 122 042

D4: US-A-4 212 302

D7: US-A-4 102 340

IV. Claim 1 of the patent as amended according to the auxiliary request reads as follows:

"An absorbent structure having a top face and a back face and which is a continuous air laid matrix of hydrophilic fibres having dispersed therein discrete particles of a water-insoluble hydrogel, wherein the front and back face halves of the absorbent structure each contain the hydrogel and the back face half of the absorbent structure contains at least 60% of the water-insoluble hydrogel material and the matrix includes a thin area of low hydrogel concentration immediately adjacent to the back face."

V. Appeal against this decision was lodged on 14 February 1994 by Opponent 02 only. Opponent 01 is not an appellant in the present proceedings but remains a party as of right under Article 107, second sentence EPC.

VI. Oral proceedings took place on 20 October 1997.

VII. The appellants (Opponent 02) requested that the decision under appeal be set aside and that the patent be revoked.

The respondents (proprietor of the patent) requested that the appeal be dismissed (main request) and that the patent be maintained in accordance with either the first or the second auxiliary requests as filed on 21 August 1997.

VIII. The parties argued essentially as follows:

(i) The appellants

The subject-matter of Claim 1 according to the main request was novel with regard to the known absorbent structures. No doubt, the absorbent structures disclosed by each of document D1, document D2 or document D3 were obtained by a continuous air-laid technique (see letter of 13 April 1995, page 2, last paragraph to page 3, lines 11). Having regard to the disclosures of document D1 or document D3, Claim 1 only differed in that the matrix includes a thin area of low hydrogel concentration immediately adjacent to the back face.

However, the subject-matter of Claim 1 (main request) did not involve an inventive step with regard to the teachings derivable from these documents. Since it was known from the disclosures of document D2 or of document D3 to use a thin layer as wicking layer, it was obvious to the skilled person to provide an absorbent structure according to document D1 with such a wicking layer in order to transport the liquid in excess towards other areas of the absorbing material.

Furthermore, it was also known to locate such a layer either near to the top face or to the back face of an absorbent structure (see document D2, the sentence bridging the pages 10 and 11).

(ii) The respondents

None of the cited documents described a continuous air-laid matrix for an absorbent structure having a hydrogel distribution which was higher in the back face than in the front face and in which a thin area of low hydrogel concentration was provided immediately adjacent to the back face, as recited in Claim 1, nor would it be obvious to the skilled person how to arrive at the invention.

Reasons for the Decision

1. The appeal is admissible
2. The amendments made to Claim 1 as granted and forming the basis for the interlocutory decision of the opposition division, were considered to meet the requirements of Article 123(2) and (3) as mentioned in this decision and the board agrees with this.

3. *State of the art and novelty of claim 1 (main request)*
- 3.1 According to the consistent case law of the boards of appeal, a document takes away the novelty of any claimed subject-matter derivable directly and unambiguously from that document including any features implicit to a person skilled in the art in what is expressly mentioned in the document where the importance of the words "derivable directly and unambiguously" was stressed (see decision T 511/92, not published or T 0565/92, OJ EPO 1996, 32).
- 3.2 Applying this principle, examination of the documents D1, D2 and D3 gives the following results:
- 3.2.1 The absorbent structure according to document D3 comprises a continuous air-laid matrix of hydrophilic fibres having dispersed therein discrete particles of hydrogel (see page 11, lines 21 to 28). Though not explicitly mentioned, the structure has front and back faces.

The object of this absorbent structure is to more fully exploit the absorbent capacity of the hydrogels than has been possible previously (see page 3, lines 27 to 29).

The absorbent structure is obtained by a process comprising a step of air-laying a matrix of hydrophilic fibres and particles of water insoluble hydrogel in a weight ratio of from 30:70 to 98:2 (see Claims 1 and 9).

As stated in the description (pages 18 to 24), tests have been made showing the effects of the fibre/hydrogel ratios on the performance of the absorbent structure. According to the examples and the

tables mentioned in the description, each absorbent structure has a constant fibre/hydrogel ratio, but the ratio is different from one structure to the other. However, the ratio of hydrogel is not made variable throughout an absorbent structure and, consequently, there is no disclosure of one face half of the structure containing a higher ratio of hydrogel than the other.

The description further mentions (see page 5, lines 24 to 27) that the hydrogel particles may be randomly dispersed or in a pattern of areas with a low fibre/hydrogel ratio and areas of a high fibre/hydrogel ratio (including areas of fibres alone). However, the description is silent about the meaning of "pattern of areas". Therefore, it cannot be considered that a thin area of low hydrogel concentration immediately adjacent to the back face of the absorbent structure is unambiguously and clearly disclosed in document D3.

The absorbent structure according to Claim 1 differs therefrom in that

- (i) hydrogel is provided in the two face halves,
- (ii) the back face half contains at least 60% of the hydrogel material,
- (iii) the matrix includes a thin area of low hydrogel concentration immediately adjacent to the back face.

3.2.2 Document D2 relates to an absorbent structure comprising at least an absorbing layer and a wicking layer. The absorbing layer is made of hydrophilic fibres having dispersed therein discrete particles of

hydrogel (see page 13, line 5 and lines 25 to 30). The wicking layer made of hydrophilic fibres without hydrogel is superimposed upon the absorbing layer. Both layers are obtained by air-laying process (see page 13, lines 4 to 13; page 17, lines 1 to 4).

An object of this composite layer is to improve the absorptive capacity of the hydrogel available in the structure (see page 4, lines 6 to 10; lines 15 to 28).

The appellants argued at the oral proceedings that the structure of the superimposed air-laid layers was maintained after the subsequent compression step, so that there was no distinguishing structural feature between the known absorbent after compression and the absorbent as claimed, since the wording "continuous air-laid" had the same meaning as the wording "continuous air-laid matrix" in Claim 1.

However, in the Board's view, the onus is on the appellant to demonstrate by clear and convincing evidence the facts it alleges. In the present case, the appellant failed to submit any additional element supporting that there was no structural difference between the interface of the known two compressed layers and a corresponding zone of the claimed single matrix where a variation of the hydrogel within the matrix could be observed. In the absence of such evidence, the board is satisfied that physical changes would probably take place at the interface of the two compressed layers. It results therefrom that document D2 does not disclose any single continuous air laid matrix as specified in Claim 1.

As to the hydrogel distribution, the description of document D2 shows that hydrogel is distributed somewhat evenly throughout the fibrous absorbing layer (see page 5, lines 13 to 15; page 16, lines 13 and 14).

Therefore, the absorbent structure according to Claim 1 differs from the disclosure of document D2 in that

- (i) hydrogel is provided in the front face half
- (ii) a single continuous air-laid matrix is provided
- (iii) at least 60% of the hydrogel material is present in the back face half.

3.2.3 Document D1 discloses an absorbent structure having an upper face and a lower face and which is an air-laid batt panel of hydrophilic fibres having dispersed therein discrete particles of water-insoluble hydrogel.

An object of the disclosure made in document D1 is to provide an absorbing structure having in addition to relative good strength, good shape and volume stability also enhanced fluid retentivity (see column 1, lines 38 to 63).

According to the embodiment described in document D1, (column 4, lines 12 to 39), the hydrogel particles are **distributed in** the air-laid panel whereas in Claim 1 of the same hydrogel particles are said to be **distributed within** the panel or batt. It results that the air-laid matrix comprises hydrophilic fibres without hydrogel particles. The mention (column 3, lines 40 to 43) that the densified layer "is formed in an air-laid, fluffed wood pulp or batt panel containing particulate hydrocolloid material...", is a confirmation that the air-laid matrix as previously defined relates to the invention as a whole; suitable air-laid panels such as those mentioned in the prior art are subsequently

submitted to hydrogel particles distribution (see column 3, lines 50 to 52). Therefore, in the Board's judgement, there is no disclosure in document D1 of a continuous air-laid matrix of hydrophilic fibres with hydrogel particles.

According to document D1 (see column 4, lines 20 to 37; column 2, lines 27 to 37 and Figure 3), predetermined pressure and temperature differential are applied to one or both faces of the panel in order to obtain a densified layer, which is preferably formed in the thickness of the panel at approximately the mid-plane. As a result (see column 3, lines 46 to 50), a substantial portion of the hydrogel particles is fixed in the panel, either by mechanical entrapment in the densified layer and/or by bonding to cellulosic fibres in the panel substantially throughout the panel. However, document D1 makes no distinction between front face (which is applied on the wearer) and back face.

Further, it is specified in document D1 (see column 5, lines 40 to 46) that some hydrogel particles are substantially fixed in the densified layer whereas other hydrogel particles are fixed substantially throughout the thickness of the batt. Therefore, it cannot be inferred that the absorbent structure has more than 60% of hydrogel in one face half. However, the schematic representation of Figures 4 and 5 is insufficient to conclude that the hydrogel distribution with respect to the front and the back faces should be the same as that claimed in the patent in suit.

Therefore the absorbent structure according to Claim 1 differs from that disclosed in document D1 in that:

- (i) the back face half of the absorbent structure contains at least 60% of the total amount of hydrogel,

(ii) the matrix includes a thin area of low hydrogel concentration immediately adjacent to the back face.

3.2.4 Since none of the prior art documents referred to during the appeal proceedings discloses all the claimed features taken in combination, the subject-matter of Claim 1 according to the main request is new within the meaning of Article 54(1) EPC.

4. *Inventive step (claim 1, main request)*

4.1 Document D3 represents the state of the art nearest to the subject-matter of Claim 1, since it discloses a structure suitable for enhancing liquid absorption, which comprises a continuous air-laid matrix of hydrophilic fibres having dispersed therein discrete particles of a water insoluble hydrogel, as specified in Claim 1.

4.2 According to the patent (see page 2, lines 13 to 16 and 27 to 31) it is known that gel-blocking phenomenon reduces the expected high absorbent capacity. Although exhibiting good performance in terms of rewet and absorbent capacity, known absorbent structures such as those disclosed in document D3 can still be improved.

It is therefore an object of the present invention to provide a hydrogel-comprising absorbent structure having an improved absorbent capacity per gram of hydrogel material used (see page 2, lines 33 and 34).

4.3 This purpose is achieved in the present invention by the distinguishing features mentioned in point 3.2.1 above.

It should be kept in mind that gel-blocking refers to a phenomenon that occurs when hydrogel particle is wetted; the surface swells and inhibits liquid transmission to the inner layer. Now, for a given amount of hydrogel particles to be distributed in an absorbent structure, by providing more hydrogel particles in the back face half than in the front face half, firstly there are less hydrogel particles taking part to the gel-blocking phenomenon in the front face half; secondly the hydrophilic fibres having more room before reaching a hydrogel particle, do provide better wicking property - even though they may not have sufficient absorbent capacity - (see Patent specification page 3, lines 36 to 44). The liquid in excess in a place is then easily transmitted towards the back face and brought into contact with more hydrogel particles. Most of the available hydrogel particles take part to the absorption.

Consequently, the absorbent structure according to Claim 1 has higher liquid retaining capacity for the same amount of hydrogel; and the provision of an additional thin area of low hydrogel concentration immediately adjacent to the back face - acting as a wicking layer for transfer of the liquid in a surface - participates to a further increase of the absorbent capacity (see Example I, page 5, lines 35 to 51).

- 4.4 According to the teaching of document D3, the ratio fibre/hydrogel particles is maintained essentially constant when obtaining the absorbent structure (see point 3.2.1). Though document D3 states (page 5, lines 24 to 27) that hydrogel particles may be dispersed in pattern of areas with low and high fibre/hydrogel ratios during obtention of the absorbent structure, there is no further information about this change in the distribution of hydrogel. This statement is so vague and undefined ("randomly dispersed") to the

skilled person that he would not know how to apply it, nor for which purpose he could do it. Therefore, there is no reason for departing from the above teaching in order to provide for variation of the concentration of hydrogel during the obtention of the absorbent structure.

Consequently, document D3 cannot suggest any solution according to which the hydrogel distribution would be greater in the back face half than in the front face half.

- 4.5 Document D2 discloses the general concept of distributing hydrogel particles in the absorbent layer of an absorbent structure comprising this layer with a wicking layer in order to solve a problem identical as that of the patent in suit (see above points 3.2.2 and 4.2). The distribution is made in such a manner as to minimize interference of one particle material with another upon swelling of the superabsorbent material as it contacts the liquid. According to document D2, the distribution occurs either throughout the fibrous web (see page 5, line 15) or somewhat **evenly** throughout the web (see page 16, line 14) while the powder is **uniformly sprinkled onto and into** the structure (see page 19, lines 9 to 12).

In document D1 the pressure and heat treatment applied to the faces of the matrix allows for giving a strength to the structure and for fixing the hydrogel particles. These two results are attained by the densified layer resulting from this treatment. The densified layer takes any position within the thickness of the structure depending upon the operating conditions, the front or back face not being mentioned in the description. The teaching of document D1 is therefore to obtain a mechanical property of the structure and an increase of the absorbent capacity by the specific

condition of providing a densified layer. As to the capacity of absorption, the important feature is to fix most of the hydrogel particles, to ensure minimal loss thereof, independently of the manner the hydrogel particles are fixed (namely: in the densified layer and/or in the panel, see point 3.2.3). Therefore, there is no disclosure of any particular distribution of the hydrogel particles throughout the thickness of the panel, and this independently of the amount of hydrogel being fixed within the densified layer.

- 4.6 It results from the teaching of documents D2 or D1, that the skilled person cannot find any suggestion or hint towards the solution according to Claim 1 of improving the absorbent capacity.

Therefore, none of documents D1, D2 or D3, taken alone or in combination with each other, gives the skilled person any hint to change the density of the absorbent material in the direction of its thickness, so that the concentration of the hydrogel particles is at least 60 % of the total amount of the hydrogel in order to increase the absorbent capacity of the absorbent structure.

- 4.7 From the above reasons it follows that it was not obvious to the skilled person to arrive at the claimed absorption material in view of the cited prior art. Therefore, the subject-matter of Claim 1 according to the main request involves an inventive step as required by Articles 52(1) and 56 EPC.

6. Since Claim 1 is allowable, the same applies to claims 2 to 9 which are dependent on claim 1.

Order

For these reasons it is decided that:


The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



M. Noël

