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**D E C I S I O N**  
**of 30 October 2003**

**Case Number:** T 0557/98 - 3.3.7

**Application Number:** 91912004.8

**Publication Number:** 0535115

**IPC:** B32B 27/00

**Language of the proceedings:** EN

**Title of invention:**  
COMPOSITES

**Applicant:**  
Cochran, William H.

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 54, 84

**Keyword:**  
"Clarity - after amendment - yes"  
"Novelty - after amendment - in part (see points 4.4, 5.4 and 6.1) - yes"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 0557/98 - 3.3.7

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.7  
of 30 October 2003

**Appellant:** Cochran, William H.  
**Applicant:** P.O. Box 240  
Exeter, Rhode Island 02822 (US)

**Representative:** Geary, Stephen  
W.H. Beck, Greener & Co.  
7 Stone Buildings  
Lincoln's Inn  
London WC2A 3SZ (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 15 December 1997  
refusing European patent application  
No. 91912004.8 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** R. E. Teschemacher  
**Members:** B. J. M. Struif  
P. A. Gryczka

## Summary of Facts and Submissions

I. European patent application 91 912 004.8 based on PCT/US91/04150 was published with claims 1 to 11 as WO 92/00191. Claim 1 read as follows:

"A flexible composite comprising a high tensile strength fibrous component dispersed within a flexible or resilient polymeric matrix, the matrix and fibrous component being essentially unbonded to each other so that the composite retains essentially the flexibility of the polymeric matrix."

Claims 2 to 7 were dependent claims directed to derivatives of the composite of claim 1.

Claim 8 was a method claim reading as follows:

"The method of making the composite of claim 1 which comprises dispersing the fibrous component within the polymeric matrix."

Claims 9 to 11 were dependent claims directed to derivatives of the method of claim 8.

During examination proceedings *inter alia* the following documents were cited:

D1: US-A-4 766 014

D2: US-A-3 597 307

The applicant made further reference to:

D7: GB-A-1 192 598

D8: US-A-3 483 015

II. In a decision dated 15 December 1997, the examining division refused the above application. That decision was based on a hand written claim 1 filed during oral proceedings on 18 November 1997 and claims 2 to 14 filed with letter dated 24 June 1997 (main request) and method claims 1 to 3 as an auxiliary request.

III. That decision was based on the following reasons:

(a) The requests met the requirements of Article 123(2) EPC.

(b) The subject-matter of claim 1 of both requests did not comply with the requirements of Article 84 EPC because the following three features: "the fibres are encased in the matrix"; "there is essentially no bond and no adhesion between the fibrous component and the polyurethane matrix" and "the fibres are able to slip relative to the matrix in two directions", were in contradiction to the terms used in the description and were not clearly defined.

IV. On 11 February 1998 the applicant (appellant) filed a notice of appeal against the above decision, the prescribed fee being paid on the same day. In the statement setting out the grounds of appeal, filed on 15 April 1998, the appellant submitted six sets of claims numbered as main request and first to fifth auxiliary request and an affidavit of R. Deanin.

Reference was also made to an affidavit of L. Willwerth filed during the first instance procedure.

- V. By letter dated 2 April 2001, the appellant filed claims 1 to 25 as sole request and withdrew the previous main and auxiliary requests.
- VI. In a communication dated 11 September 2002, the board addressed objections to the claims on file with respect to Article 123(2), 84 and 54 EPC.
- VII. By letter dated 19 March 2003, the appellant filed an amended set of claims 1 to 25 (main request) and a first auxiliary request and submitted two models.
- VIII. In response to a further communication of the board, the appellant filed by letter of 3 October 2003 an amended set of claims 1 to 22 (main request) and two auxiliary requests.
- IX. Oral proceedings were held on 30 October 2003. After discussions relating to clarity and novelty the appellant filed a new main request. The former second auxiliary request remained as sole auxiliary request. The independent claims of the new main request read as follows:

"1. A flexible composite comprising a fibrous component dispersed and completely enveloped within a flexible or resilient polyurethane matrix in which the matrix is formed *in situ* about the fibrous component by positioning polyurethane-forming components about the fibrous component and allowing the polyurethane-forming reaction to occur to form the matrix with the fibrous

component enveloped in, and able to slip relative to the matrix, the fibrous component and polyurethane-forming components being such that the matrix and fibrous component are not chemically bonded to each other and whereby the composite retains essentially the flexibility of the polyurethane matrix."

"12. A flexible composite comprising a fibrous component selected from polyester fibers and polyolefin fibers, dispersed and completely enveloped within a flexible or resilient polyurethane matrix in which the matrix is formed *in situ* about the fibrous components by positioning urethane-forming components about the fibrous component and allowing the polymer-forming reaction to occur at a temperature below the melting point of the fibrous component to form the matrix with the fibers enveloped in, and able to slip relative to the matrix, the fibrous component and urethane-forming components being such that the matrix and fibrous component are not chemically bonded to each other and whereby the composite retains essentially the flexibility of the polyurethane matrix until, in use, the composite is bent sufficiently for the matrix to start bearing on and braking around the fibres."

"13. A method of making a flexible composite comprising a fibrous component enveloped within a flexible or resilient polyurethane matrix in which the matrix is formed *in situ* about the fibrous component by positioning polyurethane-forming components about the fibrous component and allowing the polyurethane-forming reaction to occur to form the matrix with the fibers enveloped in, and able to slip relative to the matrix, the fibrous component and polyurethane-forming

components being such that the matrix and fibrous component are not chemically bonded to each other and whereby the composite retains essentially the flexibility of the polyurethane matrix."

"19. An article of manufacture having a surface comprising a flexible composite as defined in any one of the claims 1 to 12."

"20. An article of manufacture having a surface comprising a flexible composite obtainable by a method as defined in any one of the claims 13 to 18."

"21. An article of manufacture having a surface comprising a high tensile strength fibrous component enveloped within a flexible or resilient polyurethane matrix which is formed *in situ* about the fibrous component at a temperature below the melting point of the fibrous component by positioning the urethane-forming reactant components about the fibrous component and allowing the urethane-forming reaction to occur, the fibrous component and urethane-forming reactant components being such that the matrix and fibrous component are chemically unbonded to each other whereby the composite retains essentially the flexibility of the matrix so as to allow for interfacial movement or slippage between the matrix and the fibrous component."

X. The appellant, in writing and during the oral proceedings, argued in substance as follows:

(a) The amendments were duly based on the documents as originally filed.

- (b) The terms objected to in the decision under appeal were clarified by suitable amendments and were consistent with the description. Furthermore, the claims contained all features essential to the invention, so that the requirements of Article 84 EPC were met.
- (c) As to novelty, claim 1 referred to fibres dispersed and completely enveloped within the matrix which was obtained by forming *in situ* the matrix about the fibrous component. The claimed subject-matter differed from D1 in that polyurethane-forming reactants, instead of an already existing polymer, were used, so that by an *in situ* process the fibres were completely enveloped in the matrix. The matrix component in D1 had a porous structure which could not be formed by an *in situ* process as claimed. Furthermore, the polymers of D1 formed a discontinuous matrix whilst the claimed subject-matter formed a continuous matrix in close contact with the fibres, so that the composite retained essentially the flexibility of the matrix until the composite was bent sufficiently for the matrix to start bearing on and braking on and around the fibres (snubbing effect). The fibres were free for sliding within the tunnels in the matrix and the composite provided properties different from those of the products of D1.

According to D2 an artificial leather was formed from a solution containing fibres and a polymer by removing the liquid whilst according to the claimed-subject matter a matrix was formed *in situ*



about the fibres by allowing the polyurethane - forming reaction to occur. Since the fibres of D2 were hydrophilic and had to be able to absorb moisture, they could not be completely enveloped by the polymer matrix.

- (d) In D7 and D8 the composites were produced by a coagulation process involving an already existing polymer. No polyurethane-forming reaction occurred to form the matrix with the fibres enveloped therein.

Thus, the claimed subject-matter could not be directly and unambiguously derived from the cited prior art.

- XI. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request (claims 1 to 22) submitted in the oral proceedings replacing the previous main request and first auxiliary request, alternatively on the basis of the single auxiliary request submitted as second auxiliary request in the letter dated 3 October 2003.

## **Reasons for the Decision**

1. The appeal is admissible

### *Amendments*

2. The amendments effected in the independent claims 1, 12, 13 and 19 to 21 are based on the documents as originally filed as follows:

Amended claim 1:

claim 1 in connection with claim 2 ("formed *in situ*"), claim 3 ("polyurethane"), page 15, lines 31 to 35 ("completely enveloped"), claim 10 in connection with page 2, lines 33 to 35 ("the matrix is formed *in situ* ... to occur"); page 7, lines 2 to 4 ("not chemically bonded"), page 15, lines 11 to 15 ("able to slip relative to the matrix").

Amended claim 12:

claim 1 in connection with claims 2 (formed *in situ* and 3 ("polyurethane"), page 15, lines 31 to 35 ("completely enveloped"), page 2, lines 33 to 35 ("the matrix is formed *in situ* ... to occur"); page 4, lines 29 to 32 ("at a temperature below the melting point of the fibrous component"), page 7, lines 2 to 4 ("not chemically bonded"); page 5, lines 13 and 14 ("polyester fibres and polyolefin fibres"), page 15, lines 11 to 15 ("able to slip relative to the matrix"), page 12, lines 16 to 18 ("until, in use, ...fibres").

Amended claim 13:

claims 8 to 10 in connection with claims 1 and 3 (polyurethane), page 15, line 19 ("enveloped"), page 2, lines 33 to 35 ("the matrix is formed *in situ* ... to occur"), page 7, lines 2 to 4 ("not chemically bonded to each other"); page 15, lines 11 to 15 ("able to slip relative to the matrix").

Amended claims 19 and 20:

claim 1 in connection with page 13, lines 17 to 23  
("Article...").

Amended claim 21:

claim 1 in connection with claim 2 ("formed *in situ*"),  
claim 3 ("polyurethane"), page 13, lines 17 to 23  
("Article..."), page 15, line 19 ("enveloped"), page 2,  
lines 33 to 35 ("the matrix is formed in situ ... to  
occur"), page 4, lines 29 to 32 ("at a temperature  
below the melting point of the fibrous component"),  
page 7, lines 2 to 4 ("chemically unbonded"), page 15,  
lines 11 to 15 ("so as to allow .... component").

2.1 The dependent claims have the following basis in the  
application as originally filed:

claim 2 : claim 1;  
claims 3, 4, 14 and 15: page 3, line 3 and page 5,  
lines 13 and 14;  
claims 5 and 16: page 2, lines 30 to 32;  
claims 6 , 7 and 17: claim 5;  
claim 8: claim 7:  
claim 9: page 16, lines 5 and 6;  
claim 10: page 16, lines 6 to 14;  
claim 11: page 15, lines 11 to 15;  
claim 18: page 4, lines 24 to 33, page 9, lines 11 to  
13;  
claim 22: page 14, line 6.

- 2.2 From the above it follows that the amendments effected are based on the application as originally filed so that the requirements pursuant Article 123(2) EPC are met.

*Clarity*

3. According to Article 84 EPC, the claims shall define the matter for which protection is sought. They shall be clear and concise and be supported by the description.
- 3.1 In the decision under appeal, the following three features were objected to under Article 84 EPC:
- "the fibres are encased in the matrix";
  - "there is essentially no bond and no adhesion between the fibrous component and the polyurethane matrix" and
  - "the fibres are able to slip relative to the matrix in two directions".
- 3.1.1 With respect to the first feature, the term "encased" has been replaced by the term "dispersed and completely enveloped" (claims 1 and 12). This amendment clarifies that the fibres are completely enveloped in the matrix. The description (see page 7, lines 27ff, page 8, lines 30ff and page 15, lines 27 to 31), can be brought in line with this restriction at a later stage of the proceedings.

3.1.2 The second term objected to has been amended by specifying that the polyurethane matrix and the fibres are "not chemically bonded" to each other. Since a definition for the term "chemical bonding" can be found in any chemical standard dictionary, the amended feature is now clear for the skilled person who is able to select the fibrous components and urethane-forming components so that in the composite the fibres and the matrix are not chemically bonded together.

3.1.3 The third feature objected to relates to the relative movement or slippage between the matrix and the fibres. According to the decision under appeal, the statement in the description that the fibres do not change position before, during and after deformation with respect to the matrix (page 3, lines 1 to 3 from the bottom), was considered to be in contradiction with the wording in the claim.

The amended claims still mention that the fibers are able to slip relative to the matrix, but do not refer to the term objected to that "the slippage is two directional". Furthermore, according to the amended independent claims the matrix must be flexible and the fibres and the matrix are not chemically bonded to each other. A relative slippage between the two components of the composite is thus possible if the flexible matrix moves for example by stretching whilst the fibres do not change their position. Consequently, the cited passage in the description that the fibres do not change position before, during and after deformation with respect to the matrix is a mere illustration of the behaviour of the fibres in relation to the matrix,

which is in line with the requirement as claimed and not in contradiction thereto.

- 3.1.4 From the above it follows that the objections raised in the decision under appeal have been remedied and that the amended claims can be considered as clear.

*Novelty*

4. Since novelty objections have been raised by the first instance in its communications, and since the appellant requested that in view of the already long lasting examination proceedings also substantive questions should be settled, the board has exercised its power to deal with that requirement, although novelty was not an issue in the decision under appeal.

The objections raised during examination proceedings were mainly based on D1 and D2. Thus, the question arises whether the claimed subject-matter is novel over that prior art.

*Claims 1 and 12*

- 4.1 D1 describes a process for producing artificial leather similar to natural leather by chemically processing porous, synthetic sheet material comprising a porous polyurethane matrix and a pressed urethane resin cover film patterned to imitate real leather, said process comprising the steps of:

treating the synthetic sheet material with an aqueous solution containing at least one specific metal salt

until said sheet material is saturated by said solution;  
and in combination:

further treating said sheet material, with a water emulsion of fatty material selected from the group consisting of mineral oil, sulfated sperm oil and esters of substituted or unsubstituted fatty acids having from 12 to 24 carbon atoms (claim 1).

Said leather imitating material formed from polyurethane resin layers comprises a porous open-cell matrix embedded with polyester or polyethylene fibres allowed to move essentially freely along the axes inside the matrix (column 1, lines 32 to 38). A section of such a material is shown in Figure 1.

According to example 1, the polyester fibres in such a composite material are oriented in various directions and housed in sliding manner inside the porous polyurethane matrix (D1, column 5, lines 36 to 38).

- 4.2 According to D1, the porous structure of the polyurethane matrix is first subjected to a soaking process by which practically all the pores are filled with liquid before the first processing solution consisting of bi-and/or trivalent metal solution is applied (column 3, lines 21 to 30). A pseudo-tanning caustic soda solution causes part of the pores on the material to be fully saturated, and during a precipitation stage, part of the hydroxides precipitate in gel form straight into the said pores which are thus filled with gel.

Upon completion of the precipitation stage, the sheet material is washed and treated with a solution of water and a di- or polyaldehyde to afford flexibility. Finally, the material so processed is put through a number of further processes, the most important being a greasing step which has been found to be essential for obtaining the required results, i.e. for transforming the original synthetic material into one identical to real leather (column 3, lines 51 to 59).

According to D1, the greasing process is particularly effective in that the esters and oils, which would not normally be retained by compact synthetic resins, are retained by the pores and the synthetic fibres embedded in the porous synthetic matrix. The oils and esters also improve fibre flow inside the porous matrix in such a manner as to give the processed material the characteristic consistency and feel of real leather (column 4, lines 2 to 12).

From the above disclosure of D1 it can be derived that the fibres must be connected to the open porous structure of the matrix, so that the treating solutions can penetrate the pores and affect the fibres inside the matrix. Quite to the contrary, according to the claimed subject-matter the fibrous components are completely enveloped within the polyurethane matrix.

- 4.3 D2 discloses a supple sheet material suitable to be used as base material for the manufacture of artificial leather which comprises a non-woven condensed web formed from fibrous material consisting essentially of substantially hydrophilic polymeric fibres, and a polymer filler which has substantially no adhesion to



said fibres, said hydrophilic polymeric fibres having a moisture pick-up of at least 7% of the weight of said fibres when placed in a moist atmosphere with a temperature of 20 °C and a relative humidity that changes from 50% to 95%, said filler being homogeneously distributed throughout said web and cohering at spaces between said fibres, and said sheet material having a density of at least 0.5 gram per cubic centimeter and a total filler content of not more than 30% by weight based on the weight of the sheet material (claim 1).

According to claim 3 the filler is a polyurethane. Such a polyurethane filler may be produced by impregnating the web of a fibrous material with a solution of polyurethane in a mixture of a solvent, for instance, dimethylformamide, and a small amount of a non solvent, for instance, water, followed by precipitating and removing the solvent and the non-solvent. The process is in particular suitable for obtaining a homogeneously distributed and porous filler which has substantially no adhesion to the fibrous material (column 4, lines 27 to 34). Such a process is illustrated in examples I and II of D2 wherein a porous polyurethane matrix is obtained.

Since, in order to provide suppleness, the moisture absorption capacity of the sheet material and its ability to swell and shrink dependent on the moisture content are key features of D2, (see column 3, lines 14 to 17) and since hydrophilic polymeric fibres within the sheet material are necessary for that purpose, the fibres of that sheet material must be accessible for the absorption of water by the porous polyurethane

filler and thus cannot be completely enveloped within the matrix.

4.4 Consequently, D1 and D2 do not directly and unambiguously disclose that the fibrous component is completely enveloped within the polyurethane matrix so that the subject-matter of claims 1 and 12 is considered to be novel over D1 and D2.

4.5 In view of the above difference, it can be left open for the novelty of the subject-matter of claims 1 and 12, whether the fact that the polymeric matrix is formed *in situ*, provides, as argued by the appellant, a further distinction over the cited prior art.

*Claim 13*

5. As the product feature "dispersed and completely enveloped" has not been introduced into the process claim 13, the novelty of the subject-matter of that request must be examined separately.

5.1 D2 does not disclose an *in situ* polymerization process as specified in process claim 13 (see point 4.3). Although D1 itself does not disclose a process for the production of the porous sheet material disclosed therein, the appellant argued that said sheet material could be produced by a process disclosed either by document D7 or D8.

5.2 D7 discloses a process for producing a microporous sheet material which comprises coating a substrate with a solution comprising a film forming polyurethane in a water-miscible organic solvent, and coagulating the

polymer by treating the coated substrate with an aqueous solution of at least one water soluble salt of water-soluble inorganic and organic salts of lithium sodium, potassium, calcium, aluminium, magnesium, copper, iron, zinc, manganese or ammonium (claim 1).

5.3 D8 discloses a method of manufacturing microporous sheet material for an imitation leather which comprises the steps of:

- (1) impregnating or coating a substrate with a polyurethane elastomer in an organic solvent;
- (2) treating this product in a bath comprising a coagulating liquid for said polyurethane elastomer, which liquid is at least partially miscible with said organic solvent to obtain a cellular polyurethane structure having mutually communicated micro pores;
- (3) removing said organic solvent from the cellular polyurethane thus obtained; and
- (4) removing said coagulating liquid from the resulting product,

which comprises dissolving from 0.1 to 50 weight percent based on the elastomer of a coagulation regulating agent in the polyurethane elastomer solution, which agent is substantially insoluble in the coagulating liquid and has a moderate degree of miscibility with said polyurethane elastomer, said agent being selected from certain specified compounds (claim 1).

5.4 Since in D7 and D8 only physical coagulation processes, which start from an already formed polyurethane, are mentioned, these documents do not disclose the *in situ* reaction of urethane-forming components about the

fibrous components. Thus, the process according to claim 13 is novel over these cited prior art documents.

6. Since the decision under appeal has only dealt with the objections under Article 84 EPC and a final assessment of inventive step is still necessary, the board exercises its discretion to remit the case for further prosecution (Article 111(2) EPC).

6.1 Regarding novelty of the article defined in independent claims 20 and 21, it is noted that these claims lack the distinguishing feature over D1 and D2 "dispersed and completely enveloped", introduced in claims 1 and 12 during the oral proceedings. The appellant has argued for the first time in the oral proceedings that the product-by-process feature which specifies that the matrix is formed by an *in situ* polymerization excludes that a porous structure such as in D1 or D2 can be produced (see Case Law of the Boards of Appeal of the European Patent Office, 4th edition, 2001, II.B.6.2 and 6.3). The board notes however, that the affidavits filed during examination proceedings do not support this allegation and that also no other evidence has been presented in that respect. In order to give the appellant an opportunity to present the necessary evidence in this respect the board decides that this question should be dealt with by the examining division.

6.2 The appellant may, however, incorporate the distinguishing feature specified in claims 1 and 12, i.e. that the fibrous component is dispersed and completely enveloped, in all independent claims or draft, according to Rule 29(4), first sentence, EPC, the independent process and material claims so as to

refer back to claim 1. The number of independent claims should be concise.

- 6.3 Specific attention should be paid to Rule 35(13) EPC so that the terminology throughout the European patent application is consistent (see for example point 3.1.1).

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.

The Registrar:

The Chairman:

C. Eickhoff

R. Teschemacher