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D E C I S I O N
of 27 January 2005

Case Number: T 0240/03 - 3.2.6

Application Number: 95300566.7

Publication Number: 0670385

IPC: D04H 13/00

Language of the proceedings: EN

Title of invention:
Textile structures, and their preparation

Patentee:
FiberVisions, L.P.

Opponents:
ALBIS SpA
Corovin GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 83, 100(b)

Keyword:
"Disclosure - sufficiency (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0240/03 - 3.2.6

D E C I S I O N
of the Technical Board of Appeal 3.2.6
of 27 January 2005

Appellant: (Proprietor of the patent)	FiberVisions, L.P. 1313 North Market Street Wilmington, DE 19894 (US)
Representative:	Howard, Paul Nicholas Carpmaels & Ransford 43 Bloomsbury Square London WC1A 2RA (GB)
Respondents: (Opponent OI)	ALBIS SpA Via Nirone 8 I-20123 Milano (IT)
Representative:	Matkowska, Franck Matkowska & Associés 10, avenue de la Créativité F-59650 Villeneuve d'Ascq (FR)
(Opponent OII)	Corovin GmbH Woltorfer Strasse 124 D-31224 Peine (DE)
Representative:	Schulz, Björn Patentanwalt c/o Corovin GmbH Woltorfer Strasse 124 D-31224 Peine (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 20 December 2002 revoking European patent No. 0670385 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: G. C. Kadner
Members: G. L. De Crignis
J. H. Van Moer

Summary of Facts and Submissions

I. European patent No. 0 670 385 granted on application No. 95300566.7, was revoked by the opposition division by decision announced during the oral proceedings on 26 November 2002 and posted on 20 December 2002.

The decision of the opposition division was based on the finding that the subject-matter of claim 1 of the main request and of auxiliary requests 1 to 3 with respect to its feature "b)" requiring second fibers having surfaces characterized by a melt flow rate of at least about one-third of the melt flow rate of the first fibers did not comply with the requirements of the EPC since particularly with respect to this feature the invention was not sufficiently disclosed over the whole range claimed (Article 83 EPC) by applying the cited ASTM test methods for melt flow rate:

D18: ASTM Procedure D 1238 - 82: Standard Test Method for flow rates of thermoplastics by extrusion plastometer;

and for intrinsic viscosity

D19: ASTM Procedure D 2857 - 70: Standard Test Method for dilute solution viscosity of polymers

this objection could not be overcome. Particularly there was no method disclosed as to how to separate or to determine the **surface** of a fiber. An exception to this was the surface of the polymer fiber being composed of polypropylene, since in the description a

conversion factor for converting intrinsic viscosity into melt flow rate for polypropylene was specified. With respect to auxiliary request 4, the subject-matter of claim 1 and particularly its feature "a)" of the second fibers referred at the same time to a non-uniform melt viscosity and to a substantially constant melting point across the cross-section but no enabling disclosure was present indicating how to obtain such fibers.

Auxiliary requests 5 to 7 did not meet the requirements of the EPC because the subject-matter of claim 1 of these requests did not involve an inventive step. In arriving at these conclusions the opposition division referred in particular to the following documents:

D1: US-A-4 508 113

D11: US-A-3 715 251

D12: Olivieri, P.; Branchesi, M.; Ricupero, T.; The Plastics and Rubber Institute: Fourth international conference on Polypropylene Fibres and textiles, East Midlands Conference Centre, University of Nottingham, pp. 40/1 - 40/10, 23 - 25 September 1987

D13: Olivieri, P., Nonwovens Report International, pp. 30-31, August 1990

D14: Olivieri, P.; Branchesi, M.; Ricupero, T.; Chemiefasern/Textilindustrie, pp. 1103 - 1106, November 1987

D15: US-A-5 281 378

D16: EP-A-0 445 536

D22: Rauwendaal, C.; Polymer extrusion, Hanser Verlag, 1986, pp. 522 - 527

D23: Galanti, A.V.; Mantell, C.C.; Polypropylene Fibers and Films; Plenum Press, 1965, pp. 20 - 23, 56 - 63

D25: US-A-3 437 725

D27: US-A-4 041 203

D32: US-A-3 502 538

II. The Appellant (patent proprietor) both filed a notice of appeal against this decision and paid the appeal fee on 13 February 2003. The statement of grounds of appeal was filed on 25 April 2003 together with a new main request and three auxiliary requests, the first three of these requests corresponding to auxiliary requests 5 to 7 which had been filed during the opposition proceedings, and annexed the following documents:

D36: Exhibit A - Curve / Table 2/3 / DSC / DSC

D37: Exhibit B: A comprehensive evaluation of polypropylene melt rheology

D38: Exhibit C Dip fractionation / Mw/MFR / table 2

D39: Exhibit D Polymer handbook, 2nd ed, J. Brandrup - E. H. Immergut, Wiley & Sons, New York 1975, Viscosity - Molecular weight relationships and unperturbed dimensions of linear chain molecules, pages IV-1 - IV-3 and IV 8, IV-9

III. In a communication in preparation for the oral proceedings according to Article 11(1) of the Rules of Procedure of the Boards of Appeal dated 19 October 2004, the Board gave its preliminary opinion on the case. In reply the Appellant filed new auxiliary requests 4 to 9 together with letter dated 26 November 2004.

IV. Oral proceedings were held on 27 January 2005. The Appellant requested that the decision under appeal be set aside and that the European patent be maintained on the basis of the main request filed on 25 April 2003 or, in the alternative, on the basis of the auxiliary requests 1 or 2 filed on the same date, or on the basis of the auxiliary requests 4 to 8 filed on 26 November 2004.

The Respondents (opponents OI and OII) requested that the appeal be dismissed.

V. Claim 1 according to the Appellant's main request reads:

"A composite non-woven structure comprising at least one layer of first fibers and at least one layer of second fibers wherein the layers are thermally bonded to each other, the first fibers comprising meltblown microfibers;
characterized in that

the second fibers comprise fibers having nonuniform melt viscosity across their cross-section and having polypropylene surfaces characterized by a melt flow rate which is at least about one-third of the melt flow rate of the first fibers."

Claim 1 of auxiliary requests 1, 2, 4, 5, 6, 7 and 8 also comprised the feature referring to second fibers having "... surfaces characterized by a melt flow rate which is at least about one-third of the melt flow rate of the first fibers."

The subject matter of claim 1 of the main and auxiliary requests differs with respect to the second fibers and their surfaces as follows:

- Main request and auxiliary request 1:
The second fibers comprise fibers having polypropylene surfaces.

- Auxiliary request 2:
The second fibers comprise monocomponent polypropylene fibers having thermally oxidised surfaces.

- Auxiliary request 4:
The second fibers comprise monocomponent fibers consisting essentially of polypropylene, the surfaces are not further specified.

- Auxiliary requests 5 and 6:
The second fibers consist essentially of polypropylene and they are monocomponent fibers comprising thermally oxidized surfaces.

- Auxiliary requests 7 and 8:
The second fibers are monocomponent polypropylene fibers comprising thermally oxidized surfaces.

In conclusion, the second fibers of all requests comprise or consist of polypropylene and the surface is specified as being thermally oxidized or no further specification is present.

The further amendments in the auxiliary requests are of no further relevance for this decision.

VI. In view of the Appellant's requests, at the beginning of the oral proceedings the Board gave its preliminary opinion that before discussing all other issues, the questions relating to the feature common to claim 1 of all requests and referring to the second fibers having "... surfaces characterized by a melt flow rate which is at least about one-third of the melt flow rate of the first fibers" should be discussed. These doubts referred to sufficiency of disclosure with respect to the possibility to identify the surfaces of the second fibers and to the possibility to perform on these surfaces the test method for intrinsic viscosity in order to convert it to the claimed amount of the melt flow rate (Article 83 EPC).

VII. In support of its requests the Appellant essentially relied upon the following submissions:

The skilled person was not simply a manufacturer in nonwovens but someone with skills in the design of nonwovens and with knowledge in methods of producing composites. A series of examples for polymers suitable

for the indicated first and second fibers were given in the patent in suit (paragraphs 0026 and 0047).

Insufficiency could not be present because there were given standard methods D18 and D19 for determining the melt flow rate and intrinsic viscosity.

The formula disclosed in the patent in suit for the conversion of the intrinsic viscosity into the melt flow rate was defined particularly for the present case. It was not necessary to use any other formula. The fact was not relevant that in D26 or D37 the formulae were different and took into account the molecular weight and the molecular weight distribution since only the formula given in the patent in suit should be applied.

With respect to the solubility of the surface two steps were to be distinguished: first the separation phase where the surface should be solved from the fiber and second the determination of intrinsic viscosity.
The separation phase was independent on the test conditions. The time conditions for solving the surface should be calculated by the technician.

The test procedure disclosed in D19 should be adjusted to the teaching of the patent. The skilled person should test experimentally how to adjust the teaching to a particular polymer and its surface. This would be a purely empirical matter and no problem for the skilled practitioner. As an appropriate solvent for polypropylene decalin was not only mentioned in the patent in suit but was also known to the skilled person, as exemplified by D39. In order to arrive at the desired concentration of dissolved polymer in the test

solution for determining intrinsic viscosity, the skilled person could start with the same concentration as given for polyethylene in D19 and the concentration should be adapted according to the desired needs.
In case the second fibers had been rendered hydrophilic by treatment with a spin finisher, the spin finish should be washed off the fibers before the determination of intrinsic viscosity.

VIII. The respondents essentially argued as follows:

The skilled person did not know how to obtain, to reproduce or to determine whether a fiber has surfaces with a melt flow rate of at least one third of the melt flow rate of the first fibers.

There was no method disclosed as to **how to dissolve the surface of the fiber**. In the patent in suit it was stated that it is difficult to separate the surface of the fiber. Therefore, it should be considered extremely important to disclose a reliable and reproducible method for such a difficult step.
The depth of the surface was nowhere defined and the velocity according to which a fiber is solved may depend on the diameter of the fiber as well. The solving of only the surface in decalin had not been explained since according to the state of the art the whole polypropylene fiber was to be dissolved.

The staining with RuO_4 as mentioned in the patent in suit was completely irrelevant since it is not related to any test method. It only referred to the possibility to make SEM pictures (one cross-section or one top view) of a fiber which was stained with RuO_4.

With respect to D19 and the determination of intrinsic viscosity it should be noted that this standard test method is disclosed as being applicable to all polymers that **dissolve completely.** A procedure for polypropylene was not disclosed therein. Furthermore, attention was drawn to the fact that the viscosity of polymer solutions may be affected drastically by the presence of additives (colorants, fillers, or low-molecular-weight species). Hence, it would be necessary to know the exact conditions for such a test procedure to be followed with respect to time, temperature, fiber diameter and concentration of polymer in solution.

According to the description of the patent in suit, the melt flow rate of the surface region should be determined via conversion from the intrinsic viscosity value. For polypropylene surfaces a formula was given as being mfr = $327/(iv)^5$ and the conditions were given that the solvent employed should be decalin at a test temperature of 135°C. The skilled person was confused since D15 (mentioned in the patent in suit as indicating suitable second fibers in paragraph 0047) gave examples where the fibers were also made of monocomponent polypropylene but the conversion factor calculated from table 1 in D15 was different from and not constant as the one disclosed in the patent in suit. Thus, the skilled person was left without information as to why there should be such a constant factor, on which basis it was calculated and why it did apply in this case.

D26 as well as D37 also disclosed conversion formulae but took into account the molecular weight and its distribution.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

2.1 Since the subject-matter of claim 1 of all requests refers to second fibers having "... surfaces characterized by a melt flow rate which is at least about one-third of the melt flow rate of the first fibers", the objection to lack of sufficiency with respect to this feature applies to all requests.

2.2 Since the decision under appeal focuses on the question whether this feature is disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC), the Board will concentrate on this feature.

3. *Sufficiency of disclosure*

3.1 The skilled person - irrespective of whether it is a specialist or a team in polymer science or in nonwoven engineering - undeniably had access to the general state of the art and particularly to the ASTM standard methods D18 and D19. The skilled person further could be expected to perform these methods such as disclosed therein. Furthermore, this skilled person - being aware of the state of the art - knew that melt flow rate and

intrinsic viscosity are related parameters and was capable of converting the one into the other - as known from D26 and D37. Thus, the skilled person was also aware of the dependency of these parameters on molecular weight and on molecular weight distribution of the polymer. This skilled person was also capable of producing nonwovens from different polymeric fibers, such as melt blown, spunbond or staple fibers.

It could not be expected however, from this person to perform scientific research in order to adapt the available methods to areas indicated as not being appropriate or to solve additional problems before being capable of applying the suggested methods.

3.2 The determination of the intrinsic viscosity and its conversion to the melt flow rate is only possible if the actual **surface** region of the second fiber could be established. Therefore, in preparation for whichever test method was to be applied the surface region of the second fiber had to be **separated** from the rest of the fiber in order to **determine** the melt flow rate of the second fiber surfaces.

3.3 With respect to the **separation step** no disclosure whatsoever is present in the patent in suit. Neither has any document been submitted in order to demonstrate such a separation step. It is explicitly stated in the patent in suit (paragraph 0053) that the "difficulty of separating the surface region from the rest of the fiber" has to be overcome. However, how to separate only the surface region from the remainder of the fiber remained without response particularly in view of the

fine diameters (0.05 to 6 dtex, paragraph 0049 of the patent in suit) of the fibers in question.

D39 can be used to confirm that polypropylene is soluble at 135°C in decalin. D39 discloses solubility constants for atactic and isotactic polypropylene, and consistently decalin is mentioned as a suitable solvent at a temperature of 135°C. But no disclosure is present as to how surfaces of polypropylene polymers could be separately dissolved. In claim 1 of all present requests the second fiber can comprise or consist of polypropylene. Accordingly, the second fiber could be **solved completely** by decalin.

3.4 With the exception of the main request and auxiliary requests 1 and 4, the subject-matter of claim 1 of all other requests refers explicitly to thermally oxidized surfaces of the second fibers. With respect to these surfaces, the Appellant suggested the determination via staining with RuO_4. However, D17 referred relevantly to the staining of polymer **films** only and neither fibers are mentioned nor is a method disclosed as to how to determine the surface or its depth or region throughout the fiber. Relevant figures 1 to 4 of the patent in suit disclose staining results for fibers but also do not provide a basis for the determination of the depth or region of the surface of the fibers. Consistent with both, D17 as well as figures 1 to 4 of the patent in suit, D16 discloses that the surface zones are usually not visually ascertainable in test samples, nor that an even depth of oxygen diffusion **throughout the treated fiber** can be assumed (page 3, lines 48 - 50). Thus, there is neither given any indication as to how to determine the thermally oxidized surface of the second

fibers in general nor is there given an example with respect to the determination of the thermally oxidized surface of polypropylene fibers mentioned in the patent in suit (T196, T190 and T211).

3.5 Consequently, with respect to claim 1 of each request, the skilled person is - irrespective of its scientific or practical knowledge - neither capable to **identify** the "surface" of the second fiber nor to **separate** this unidentified "surface" from the remainder (core) of the polymeric polypropylene fiber. The opposition division came to the same conclusion for second fibers having polymeric surfaces. It follows from the points above that the Board comes to the identical conclusion with respect to second fibers comprising or consisting of polypropylene as well as - and even *a fortiori* - with respect to second polypropylene fibers having thermally oxidized surfaces. Thus the decision under appeal cannot be set aside.

3.6 As a matter of completeness the Board notes that the same deficiency applies with respect to the **test method for determination** of melt flow rate or intrinsic viscosity which is also not disclosed sufficiently clearly and completely to be carried out by the skilled person.

3.7 In the patent in suit (paragraph 0054) reference is made to the **determination step** by indicating that the standard test method D19 should be used. D19 refers to a test method for determination of intrinsic viscosity which is applicable to all polymers that **dissolve completely**. With respect to the procedure to be followed D19 consistently makes reference to the

appendix. In the appendix only a limited number of polymers are referred to (polyamide, polycarbonate, polyethylene, polyethylene terephtalate and polyvinyl chloride). Polypropylene is not mentioned. According to the Appellant's submissions the procedure in D19 referring to polyethylene would be suitable as a starting point and should be modified accordingly. However, no information is available and there is no disclosure in the patent in suit as to **which** modifications were necessary.

3.8 The Board, accordingly considers D19 as a standard test method for dilute solution viscosity of polymers which is only applicable for polymers directly disclosed therein. With respect to dissolving conditions, solvent and concentration of the test solution, D19 discloses recommendations which differ significantly for the various polymers. D19 also emphasizes that the procedure has to be followed accurately. Therefore, it would have been absolutely necessary to specify the modifying conditions exactly in order to arrive at a reliable and reproducible result.

It may well be that the skilled person could arrive at adjusting the teaching of the test procedure to polypropylene starting from the test procedure disclosed for polyethylene. However, the adjusting of the test procedure would always result in individual test procedures which are not comparable and thus no reliable and reproducible result could be arrived at. An invention is only sufficiently disclosed if the skilled person can obtain from the cross-reference the information required to reproduce the invention. If relevant details of the test method are not possible to

reproduce without any inventive effort over and above the ordinary skills of a practitioner, the disclosure is not clear and complete enough to be carried out. In the patent in suit not even one way of carrying out the test method is demonstrated.

This applies *a fortiori* since D19 refers (point 3.6) to the fact that viscosity of polymer solutions may be **affected drastically** by **additives**, colorants, or **low-molecular-weight species**. The second fibers as a whole are considered as high molecular weight species but the **surface** of the second fibers is considered as **low-molecular-weight species** (as indicated in the patent in suit paragraph 0048) if the surface is thermally oxidized. Usually polypropylene fibers always exhibit thermally oxidized surfaces, since thermal oxidation is inevitable without precaution during the spinning process (D24). Hence, the viscosity is affected drastically in the solution of the test method D19. Therefore, it is clear for the skilled person that this **test method of D19 is not applicable** particularly in relation to polypropylene polymers exhibiting thermally oxidized surfaces.

With respect to other additives, the patent in suit refers to polypropylene fibers as second fibers (as preferred T 196), which are treated with a hydrophilic finish. Thus additives are present on the surface. With respect to additives used in fiber manufacture, there is no instruction whatsoever present as to how to take into consideration their influence in the test solution. The suggestion to wash off the spin finish of hydrophilic polypropylene fibers before the test method is performed, could only apply to fibers where such a

spin finish is present. But even in these cases the migration of such spin finish into inner areas of the fiber - particularly in view of the small diameter of the fibers concerned - was not considered. However, such a migration is considered as being inevitable by the respondents and thus a wash off of the spin finish would not solve the related problem of additives being present in the test solution and thus influencing the test result. With reference to polypropylene fibers rendered hydrophilic by any other method (incorporation of additives into the spinning process) no solution at all was suggested.

3.9 In view of these unresolved issues related to the test method, it is completely irrelevant whether a correct conversion factor for converting the value measured for intrinsic viscosity into a value for melt flow rate is present or not. The skilled person is not enabled to arrive at a reliable and reproducible value for intrinsic viscosity of the surface of the second fibers and thus a conversion is impossible *per se*.

4. For these reasons, the skilled person besides not being capable to determine or identify the "surface" of the second fiber is also not enabled to determine the melt flow rate or intrinsic viscosity of the "surface" of the second fiber. Thus, the patent in suit does not comply with the requirements of Article 83 EPC and, therefore, in accordance with Articles 100(b) and 102(1) EPC, none of the requests of the Appellant is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Patin G. Kadner