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**Datasheet for the decision
of 28 June 2013**

Case Number: T 1659/10 - 3.3.06
Application Number: 99953069.4
Publication Number: 1149195
IPC: D01F 8/04, D02G 3/22
Language of the proceedings: EN

Title of invention:
Splittable multicomponent elastomeric fibers

Patent Proprietors:
HILLS, INC.
Fiber Innovation Technology, Inc.

Opponent:
Firma Carl Freudenberg KG

Headword:
Splittable multicomponent elastomeric fibers/HILLS FIBER
INNOVATION TECHNOLOGY

Relevant legal provisions (EPC 1973):
EPC Art. 54(1)(2)

Keyword:
"New item of evidence - admissible (yes)"
"Novelty (no)"

Decisions cited:
-

Catchword:
-



Case Number: T 1659/10 - 3.3.06

D E C I S I O N
of the Technical Board of Appeal 3.3.06
of 28 June 2013

Appellant: Firma
(Opponent) Carl Freudenberg KG
Höhnerweg 2-4
D-69469 Weinheim (DE)

Representative: Steglich, Gregor
Banse & Steglich
Patent- und Rechtsanwaltskanzlei
Herzog-Heinrich-Straße 23
D-80336 München (DE)

Respondent: HILLS, INC.
(Patent Proprietor 1) 7785 Ellis Road
W.Melbourne, FL 32904 (US)

Respondent: Fiber Innovation Technology, Inc.
(Patent Proprietor 2) 398 Innovation Drive
Johnson City, TN 37804 (US)

Representative: Wegner, Hans
Bardehle Pagenberg Partnerschaft
Patentanwälte, Rechtsanwälte
Prinzregentenplatz 7
D-81675 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted
31 May 2010 concerning maintenance of the
European patent No. 1149195 in amended form.**

Composition of the Board:

Chairman: L. Li Voti
Members: G. Santavicca
U. Tronser

Summary of Facts and Submissions

I. The appeal by the opponent lies from the interlocutory decision of the Opposition Division, according to which, account being taken of amended Claims 1 to 33 according to the second auxiliary request filed during the oral proceedings, the European patent 1 149 195 (application N° 99 953 069.4, published as WO 00/20178) and the invention to which it relates met the requirements of the EPC.

II. Claim 1 of the second auxiliary request dealt with in the decision under appeal reads as follows:

"1. A method for producing subdenier microfilaments, comprising the steps of:

a. producing splittable multicomponent fibers comprising

a1. extruding a plurality of multicomponent fibers having

a1.1 at least one polymer component

comprising an elastomeric polymer and

a1.2 at least one polymer component

comprising a non-elastomeric polymer,

a1.3 wherein said elastomeric polymer has a solubility parameter (δ) different of at least about $1.2 \text{ (J/cm}^3)^{1/2}$ from said non-elastomeric polymer so that said elastomeric component and said non-elastomeric component split upon thermal treatment, and

a.2 drawing said multicomponent fibers

- a2.1 to plastically deform said non-elastomeric component and
 - a2.2 to attenuate said elastomeric component
 - a2.3 such that said elastomeric component is capable of elastically contracting upon release of adhesion to the non-elastomeric component,
- b. then mechanically working the drawn multicomponent fibers without substantial premature splitting; and
 - c. then thermally treating said drawn multicomponent fibers under conditions of low or substantially no tension to separate said multicomponent fibers to form a fiber bundle comprising
 - c1. a plurality of elastomeric microfilaments and
 - c2. a plurality of non-elastomeric microfilaments which are more bulked than said elastomeric microfilaments."

III. The patent had been opposed in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC 1973). With a fax of 5 May 2010, the opponent submitted JP-37-5278 (D24) and its English translation (D24a) and requested that they be admitted into the proceedings. At the oral proceedings, a certificate (D24b) for the translation D24a was filed.

IV. The relevant findings of the decision under appeal for these proceedings are:

- (a) D24, D24a and D24b were all admitted into the proceedings because they were *prima facie* highly relevant (Article 114(1) EPC 1973).

- (b) Since the second auxiliary request filed during the oral proceedings was a reaction to the admission of D24, it too was admitted into the proceedings.
- (c) The amendments "subdenier microfilaments" and "solubility parameter (δ) different of at least about $1.2 \text{ (J/cm}^3\text{)}^{1/2}$ from said non-elastomeric polymer", in the claims of the second auxiliary request, were based on the application as filed and restricted the scope of the claims. Thus, the requirements of Article 123, paragraphs 2 and 3, EPC were fulfilled, and this was not contested.
- (d) The amended claims were clear (Article 84 EPC 1973). The feature "subdenier microfilaments" meant filaments having a titer of less than 1 denier.
- (e) As to novelty, there was no direct and unambiguous disclosure of the feature "subdenier" in D24a, because during the relaxation step the titre of the filament increased. So the calculations made by the opponent were not convincing. Also the feature "solubility parameter (δ) different of at least about $1.2 \text{ (J/cm}^3\text{)}^{1/2}$ from said non-elastomeric polymer" was not directly and unambiguously disclosed in D24a. Thus, the subject-matter of Claim 1 was novel. Since all independent claims included the feature of the solubility parameter, their subject-matter too was novel over D24a.

V. In a communication in preparation for oral proceedings, the Board drew attention to the issues that needed to be debated and a decision taken on them (*inter alia* lack of novelty).

VI. In response to the communication by the Board:

- (a) the respondents announced that they would not attend the scheduled oral proceedings;
- (b) the appellant (by a letter dated 7 May 2013) submitted a complete copy of Brandrup und Immergut, Polymer Handbook, 2. edition 1975, Pages IV337 to IV359, John Wiley & Sons, Inc., renumbered as D38.

VII. Oral proceedings were held on 28 June 2013.

VIII. The appellant requested that the decision under appeal be set aside and the patent revoked.

IX. The respondents did not submit any requests.

X. The appellant (opponent) essentially argued as follows:

New item of evidence

- (a) D38 was admissible because it was submitted in reaction to the communication by the Board. Furthermore, D38 was acknowledged in the application as filed and considered in the examination proceedings as D0. D38 was thus known to the patent proprietors.

Novelty

- (b) D24a disclosed a process for simultaneously extruding a bundle of multicomponent fibres, comprising elastomeric and hard fibres, which were drawn and relaxed, and which upon relaxation, carried out under heating and no tension, split into their component fibres. The fibres could be mechanically worked before splitting (reference

was made in particular to pages 3, lines 17-21, and to page 17, lines 18-22). The calculation provided by the appellant showed that at least the split non elastomeric fibres were of subdenier size. Claim 1 did not require that also the elastomeric fibres be of subdenier size. The alleged further distinction (difference in solubility parameter) was a functional feature of the materials used. Since in the process of D24a the different fibres were coextruded without mixing, it was inherent that the polymers had different solubility parameters; the onus to show that the claimed difference was not attained in D24a thus lay on the respondents and had not been discharged. In fact, D38, acknowledged in the patent in suit, disclosed in its Table 5 that the difference in parameter solubility between polyurethane and acrylonitrile (disclosed in D24a) was greater than the minimum required by Claim 1 of the patent, and also greater than the difference between polyurethane and polypropylene, mentioned as preferred polymers in the patent. Also, the styrene sulfonic acid monomer contained in the acrylonitrile copolymer rendered it more hydrophilic. D24a also disclosed further polymers fulfilling this requirement. So the difference in solubility parameter specified in Claim 1 was inherent and would be read by the skilled person considering the disclosure of D24a. On the other hand, if this difference reflected a particular selection of materials, the criteria set out for a novel chemical selection were not fulfilled. Therefore, the subject-matter of Claim 1 was not novel over D24a, and the patent should be revoked.

XI. The respondents (patent proprietors) did not provide any response to the statement setting out the grounds of appeal or to the communication by the Board.

Reasons for the Decision

1. The appeal is admissible.

New item of evidence

2. D38 was submitted by the appellant less than two months before the oral proceedings, in response to the communication by the Board. However, this handbook is acknowledged and incorporated by reference in the patent in suit (paragraph [0039]). Its submission cannot therefore surprise the patent proprietors/respondents. Thus, D38 is admitted into the appeal proceedings for consideration.

Novelty

3. D24a (Claim) discloses a process for producing a bulky elastic yarn comprising:
simultaneously extruding at least two fibre-forming compositions in side-by-side relationship to form one composite filamentary structure, one of said compositions being a synthetic polymer which can be formed into filaments having a maximum breaking elongation of about 80% or less and capable of being drawn at least two times its original length, the other of said compositions being a synthetic elastomeric polymer which can be formed into elastic filaments having an elongation of at least about 100%;

- drawing said filamentary structure at least about two times its original length;
and relaxing said drawn structure.
- 3.1 According to D24a, the drawn structure is preferably heated at temperatures between about 50°C and 150°C in an essentially untensioned condition, in order to relax said structure (Appendix 4).
- 3.2 D24a (Appendix 6) also discloses a composite filamentary structure which is comprised of at least two continuous polymer components disposed in eccentric relationship to each other, one of said components being a synthetic polymer capable of forming hard fibres, the other component being an elastomer.
- 3.3 D24a further discloses (Appendix 11) a composite yarn comprised of at least two species of continuous fibres, said first species being hard fibres and said second species being elastomeric fibres having an elongation of at least 100%, said second species being essentially straight and said first species being randomly looped about said second species when said yarn is in an essentially untensioned condition.
- 3.4 D24a finally discloses a fabric comprising this yarn (page 17, lines 18-19, and page 21, lines 17-18).
- 3.5 D24a in particular discloses a yarn comprising:
(a) filaments formed from segmented elastomeric polymers (e.g. containing bis-ureylene segments alternating with segments of a low-melting polyether) (Appendices 3, 5, 10, 15);

(b) filaments formed of a synthetic polymer which is acrylonitrile (Appendices 9, 14).

3.6 As to the step of Claim 1 "then mechanically working the drawn multicomponent fibres without substantial premature splitting", it is not only generally disclosed by D24a (page 3, lines 17-21, and page 17, lines 18-22), but also illustrated in Example 1 (mechanical transportation of the multicomponent fibres up to the steam cell, page 10, lines 25-28).

3.7 It follows from the foregoing that D24a generally discloses a process with all of the steps of the process of Claim 1 of the sole request.

3.8 The parametrical features "subdenier microfilaments" and "a solubility parameter (δ) different of at least about $1.2 \text{ (J/cm}^3)^{1/2}$ from said non-elastomeric polymer" are not mentioned as such in D24a. However, they refer, on the one hand, to the fineness of the filaments produced by the defined process and, on the other hand, to the materials of the filaments processed thereby.

3.9 The question thus arises whether D24a discloses a process which inherently or inevitably uses and produces materials attaining the non-mentioned features.

3.10 In its Example 1, D24 illustrates a process and the thereby attained composite structures as follows:

3.10.1 A segmented condensation elastomer (Elastomer A) is prepared by condensing one mol of poly(tetramethylene oxide) glycol having a molecular weight of 1,000 with one-half mol of toluene diisocyanate. One mol of dimer

having hydroxyl end groups is then reacted with two mol of methylene bis(4-phenyl isocyanate). The resulting one mol of a polyether diurethane having isocyanate terminal groups is then reacted with one mol of hydrazine monohydrate in N,N'-dimethyl-formamide (DMF) to produce a copolymer with an inherent viscosity of 1.6 as measured in hexamethyl phosphoramidate solution.

3.10.2 Then, a spinning solution containing 20% of the above elastomeric polymer and a 27% solution of the copolymer acrylonitrile/methyl acrylate/styrene sulfonic acid (at a ratio of 93.6/6.0/0.4), having an intrinsic viscosity of 1.5, are simultaneously extruded through common orifices in a spinneret containing 40 orifices of 0.175 inches (1 inch = 25.4 mm) diameter into a dry spinning cell with a concurrent flow of cell gas.

3.10.3 Hence, D24a illustrates the production of a yarn of multicomponent fibres comprising a segmented polyurethane as the elastomer and a copolymer of acrylonitrile as the hard fibre.

3.10.4 The as-spun yarn (420 total denier) (1 denier = 1 g/9000 m) is a straight non-elastic yarn composed of composite filaments containing 50% of the acrylonitrile copolymer and 50% of Elastomer A by weight.

3.10.5 The as-spun yarn is drawn 8x (i.e. eight times) its original length.

3.10.6 The drawn yarn is then led through a cell containing steam at atmospheric pressure with the feed rolls to and delivery rolls from the steam cell adjusted to

permit a 50% shrinkage in the length of the yarn and draw the acrylonitrile copolymer portion.

3.10.7 The drawing and relaxing process of D24a results in the splitting apart of the hard fibres and the elastomeric fibres, i.e. relatively straight elastomeric fibres and thereon randomly looped hard fibres (Figure 2 of D24).

3.11 According to the calculation provided by the appellant (letter of 7 May 2013, paragraph bridging pages 5 and 6), the yarn spun from 40 orifices and having a total denier of 420 (1 denier = 1 g/9000 m), which is made up of composite filaments containing 50% of the acrylonitrile copolymer and 50% of Elastomer A, and which is stretched 8 times, after relaxation and splitting produces microfilaments of hard fibres and elastomeric fibre having a fineness of 0.66 denier. Since the 50% shrinkage during the relaxation step affects only the elastomeric component, whereas the hard fibres are irreversibly elongated (D24a, page 3, lines 12-17), Example 1 of D24a directly and unambiguously disclosed the production of drawn subdenier filaments.

3.11.1 However, D24a also discloses that the filaments of elastomer A undergo a 1.7x net draw when drawn 8 times and relaxed in steam or boiling water (i.e. they have a final untensioned length that is 1.7 times their original length). So the relaxed final elastomeric filaments cannot have the subdenier fineness of the plastically drawn and split nonelastomeric filaments.

3.11.2 This is, however, not decisive, as Claim 1 does not require that both elastomeric and nonelastomeric

filaments must have a subdenier size upon relaxation. In this respect, the Board does not agree with the decision under appeal. The reason therefor is that Claim 1 merely defines at its beginning the production of subdenier filaments, without then defining whether this fineness belongs to each of split (nonelastomeric) and nonsplit (elastomeric) filaments. Hence, Claim 1 encompasses the production of fibres with split subdenier filaments and non-subdenier elastomeric filaments. This interpretation is not only in line with the description of the patent in suit (paragraph [0088], last sentence), but also conforms with the willingness of the patent proprietors, as apparent from Claim 10 of the sole request, wherein a subdenier fineness is explicitly required for each component of the multicomponent fibres.

3.11.3 Therefore, Example 1 of D24a discloses a process which produces split filaments of subdenier size.

3.11.4 As regards the parameter solubility difference, D38, which is incorporated by reference in the patent in suit [Paragraph 0039], *inter alia* discloses in its Table 5 single value solubility parameters as found in the literature referred to, *inter alia* for some of the polymers disclosed by D24a or mentioned in the patent in suit, as follows:

- (i) Polyacrylonitrile (4 values ranging from 25.27 to 31.5) (page IV-356);
- (ii) Polyurethane (unknown composition) (2 values, from different methods, both being 20.5);
- (iii) Polypropylene (the preferred nonelastomeric polymer acknowledged in Paragraph [0041] of

the patent in suit) 2 values, respectively of 18.8 and 19.2.

3.11.5 It follows therefrom that:

- (a) the difference in solubility parameter between polyurethane and polypropylene, a preferred couple of polymers mentioned in the patent in suit (Example 1), fulfil the requirement set by Claim 1;
- (b) the value of the solubility parameter for polyacrylonitrile (disclosed in D24a) is much greater than that for polypropylene (disclosed in the patent in suit);
- (c) therefore, *a fortiori*, the difference in parameter solubility between the polyacrylonitrile and polyurethane polymers used in Example 1 of D24a, relating to a process having all the steps of Claim 1 of the sole request, has to fulfil the requirement set in Claim 1 of the sole request.

3.11.6 Concerning the fact that a segmented polyurethane is used in Example 1 of D24a, not the polyurethane of unknown composition mentioned in D38, the above conclusion is not only supported by the fact the segmented polyurethane of Example 1 of D24a is a thermoplastic polyurethane, which according to the patent in suit is a suitable elastomer (Paragraph [0040]). It is also confirmed by the uncontested fact that, otherwise, the multicomponent fibres of D24a would not split as described. Hence, the parameter solubility feature defined in Claim 1, albeit not mentioned in D24a, is not a distinguishing feature over D24a. The polymers illustrated in Example 1 of D24a inherently fulfil the difference in solubility required.

3.12 Summing up, Example 1 of D24a directly and unambiguously discloses a process with all of the steps of Claim 1, which produces segmented polyurethane elastomeric core filaments, on which split subdenier nonelastomeric filaments of an acrylonitrile copolymer are bulked, that inherently fulfil the product requirements set out in Claim 1 of the sole request.

3.13 Thus, the claimed subject-matter is not novel over D24.

Conclusions

4. The claimed subject-matter of the sole claim request does not fulfil the requirements of the EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

K. Boelicke

L. Li Voti