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Aktenzeichen:  
Case Number: T 94/82  
N° du recours :

**ENTSCHEIDUNG / DECISION**

vom / of / du 22 July 1983

Anmelder:  
Applicant: IMPERIAL CHEMICAL INDUSTRIES  
Demandeur :

Stichwort:  
Headword: "gear crimped yarn"  
Référence :

EPÜ / EPC / CBE Article 84, Article 52(1), Article 56

"Definition of product by a product claim containing parameters"

**Leitsatz / Headnote / Sommaire**

1. The patent claims must clearly define the subject-matter for which protection is sought (Article 84 EPC). This requirement may be fulfilled in a claim to a product when the characteristics of the product are specified by parameters related to the physical structure of the product, provided that those parameters can be clearly and reliably determined by objective procedures which are usual in the art.
2. In such a product claim, it suffices to state the physical properties of the product in terms of parameters, since it is not mandatory to give instructions in the claim itself as to how the product is to be obtained. The description must fulfill Article 83 EPC and thus enable the person skilled in the art to obtain the claimed product therein described.

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European Patent  
Office

Boards of Appeal

Office européen  
des brevets

Chambres de recours



Case Number: T 94 / 82

**DECISION**  
of the Technical Board of Appeal 3.2.1  
of 22 July 1983

**Appellant:** IMPERIAL CHEMICAL INDUSTRIES PLC  
Imperial Chemical House, Millbank,  
London SW 1P 3JF

**Representative:** Robertson, Michael Mundie  
Imperial Chemical Industries PLC  
Legal Department: Patents  
Thames House North, Millbank  
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**Decision under appeal:** Decision of Examining Division 121 of the European Patent  
Office dated 28 December 1981 refusing European patent  
application No 79 302 089.2 pursuant to Article 97(1)  
EPC

**Composition of the Board:**

Chairman: G. Andersson  
Member: M. Huttner  
Member: P. Ford

## Summary of Facts and Submissions

- I. European patent application No. 79 302 089.2 filed on 3 October 1979, published on 11 June 1980 under publication No. 0 011 915 and claiming priority of 27 October 1978 from a previous application filed in Great Britain, was refused by decision of the Examining Division 121 of the European Patent Office dated 28 December 1981. That decision was based on the Claims 1-12 as originally filed.
- II. The reasons given for the refusal were that the claims 1 to 6 referring to a drawn gear crimped polyester yarn and Claim 7 directed to a fabric containing said yarn do not define an inventive step in clear terms as required by Articles 52 and 84 of the EPC, since they merely state the problem in technical terms, (i.e. in terms of parameters) without specifying the technical features which define the solution to the problem. Claims 8-12, directed to a process for producing a synthetic yarn with latent bulk, were refused because the subject matter did not involve an inventive step on account of the prior art publications:

- (1) DE-A-2 641 978;
- (2) GB-A-1 127 005;
- (3) GB-A-1 371 951;
- (4) CH-A-587 937 and
- (5) DE-A-2 516 541

hereinafter referred to as citations 1, 2, 3, 4 and 5 respectively.

III. On the 19 February 1982 the appellants lodged an appeal against that decision, paying the fee for appeal and filing the statement of grounds in due time.

The appellants asserted that the improved latent bulk of the yarn defined in Claims 1 and 2 is not merely a desired result but expresses the structural reality in the physical form of the yarn such as crimp frequency, shape and stability in terms of certain parameters with which they have been found to correlate and which confer the fabric made from the yarn desirable and unexpected properties, showing the presence of an inventive step. They further submitted that the refusal of the process Claim 8 is based on ex post facto analysis amounting to hindsight and the combination of the selected range of birefringence values with the selected range of post gear tension values actually produces an unexpected technical effect likewise showing the presence of an inventive step.

IV. The appellants requested the cancellation of the Decision of the Examining Division and the grant of a European Patent on the basis of the original Claims 1 to 12 inclusive and as an auxiliary request, the grant of alternative Claims 1, 2, 8 and 13 together with the presently existing original Claims 3 to 7 and 9 to 12.

V. In view of the complexity of the patent application at issue the appellants also requested an oral hearing. They further requested that the Appeal be referred to the Enlarged Board of Appeal in order to ensure uniform application of the law.

- VI. In the course of the written procedure before the Board of Appeal, the appellants submitted two declarations, one by one of the inventors, Mr. W.E. Whale, regarding the question of sufficient definition of the physical structure of the yarn claimed in Claims 1 to 3 and the other by Mr. M.J. Hogarth, a research scientist of appellants, on the subject of obviousness of the process claimed in Claims 8-12.
- VII. By letter received on 19 July 1983, the appellants submitted new claims and withdrew their earlier request for an oral hearing.
- VIII. The effective independent product and process Claims 1, 6, 7 and 8 as received on 19 July 1983 read as follows:

1. A drawn gear-crimped polyester yarn with latent bulk characterised by an initial crimp of at least 1.5% and a mechanical crimp stability of above 0%, wherein the initial crimp

$$(EK) = \frac{L_0 - L_1}{L_0} \times 100\% \text{ and the mechanical crimp stability}$$

$$(KB) = \frac{L_0 - L_3}{L_0 - L_1} \times 100\%$$

are measured as follows: the gear crimped polyester yarn with latent bulk is wound at a tension of 1.0 centi-newtons per tex to form a skein of 1 metre circumference and a total decitex of 2500; the skein is hung and pre-loaded with a load of 0.01 centi-newtons per tex, heated at 120°C for 10 minutes to develop the bulk and then

cooled; the skein is subjected to a force of 1 centi-newton per tex for 10 seconds and its length,  $L_0$ , is measured; after 10 minutes the length  $L_1$  of the skein is remeasured supporting the load of 0.01 centi-newtons per tex; after an interval of 10 minutes a force of 0.1 centi-newtons per tex is applied for 10 seconds and immediately afterwards a force of 10 centi-newtons per tex is applied for 10 seconds; after 20 minutes the length,  $L_3$ , of the skein is measured under a load of 0.01 centi-newtons per tex.

6. A crimped yarn according to any one of the preceding claims in which the bulk has been developed.

7. A fabric containing a crimped yarn according to any one of the preceding claims.

8. A continuous process for producing a synthetic yarn with latent bulk comprising the steps of heating a drawable yarn, crimping the yarn by guiding it between the intermeshing teeth of a set of toothed wheels such that the yarn is caused to follow a sharply zig-zag path, the toothed wheels being rotated at a sufficient speed such that the yarn is drawn by the tension so imparted to the yarn by the toothed wheels and subsequently forwarding the crimped yarn from the toothed wheels under a controlled tension characterised in that the drawable yarn is a polyester yarn having a birefringence in the range  $32 \times 10^{-3}$  to  $125 \times 10^{-3}$  inclusive and the crimped polyester yarn is forwarded from the toothed wheels under a controlled tension within the range 0.15 to 0.50 g per decitex inclusive based on the decitex of the drawn polyester yarn.

Reasons for the Decision

1. The appeal complies with Articles 106 - 108 and Rule 64 EPC, it is therefore admissible.
  
- 2.1 The question to be considered first is whether Claim 1 fulfills the requirement of clarity imposed by Article 84 EPC.
  
- 2.2 According to the preamble, this claim is directed to a drawn gear crimped polyester yarn with latent bulk. No valid objection as to lack of clarity may be made in respect of the features specified therein, since they are readily capable of being determined by chemical analyses, and measurements or examination of the physical properties of the yarn.
  
- 2.3 So far as concerns the characterisation of the physical structure of the crimped yarn by parameters such as the initial crimp (EK) and the mechanical crimp stability (KB), the Board has no concern in view of the fact that such parameters are usual in the art and the structure of a crimped filament yarn is of such nature that it cannot be adequately defined in any other way in a reasonable manner. The technologist would naturally turn to the use of such parameters instead of the much more laboriously determined crimp frequency, shape and stability, possibly involving statistical analysis of the degree of variation in these in a particular sample, all the more as the parameters given in the claims can conveniently and reliably be obtained in following the instructions given in the description and in accordance with the German standard DIN 53840 mentioned therein.

Consequently the product Claim 1 merely specifies in its characterising portion a combination of two parameters which are indeed usual and a representative expression for the crimp frequency, shape and stability, i.e. for the structure of the imparted crimp.

- 2.4 During the appeal procedure, the Board, in its communication, expressed some doubt as to whether the bulked yarn defined by the sole two parameters, i.e. the initial crimp (EK) and the mechanical crimp stability (KB), is adequately and unequivocally defined and clearly determined thereby, and whether they suffice to distinguish reliably such yarns from other yarns which may not fall within the scope of these claims, in order that the interested public may determine without any doubt for what structure protection is actually sought.

However, as the appellants have filed a declaration by one of the inventors which states that he is a specialist in the field of gear crimped yarns and that there is to his knowledge no gear crimped polyester yarn having the advantageous properties displayed by the yarn according to the invention which does not have an initial crimp (EK) and a crimp stability (KB) within the claimed ranges, the Board is now satisfied that the claim in question adequately defines the matter for which protection is sought, in compliance with Article 84 EPC.

- 2.5 Since the contents of the application clearly teach how the claimed gear crimped yarn can be obtained by explicitly stating the process for making said yarn and thus the yarn constitutes the product obtained by such process, it suffices to state in the claim in terms of parameters the physical properties of such yarn. In order to be concise,



the product claim is not called upon to give instructions in the claim itself as to how the product is to be obtained, if the description enables the person skilled in the art to obtain the claimed product by the process therein described (Article 83 EPC), which here undoubtedly is the case.

- 2.6 Claim 1 is also clear with respect to the range of the parameters (EK) and (KB) specified therein, although only their lower limit values are indicated because drawn gear-crimped polyester yarns inherently have an upper limit. Claim 1 is also sufficiently supported in the description.
- 2.7 Hence, Claim 1 does indeed define the technical features of the yarn in terms of physical structure in a clear and concise manner and it does not merely state a technical problem to which no solution is offered. Therefore, this claim satisfies the requirements of Article 84 EPC.
3. Claims 6, 7 and 8 are also sufficiently supported by the description. Since the dependent Claims 2 to 5 and 9 to 11 merely specify narrowed down parameter ranges or constitute special embodiments of the invention claimed in the claims they depend on, and are also sufficiently supported by the description, all of these claims likewise fulfill the requirements of Article 84 EPC.
4. Of the documents uncovered by the search report, only Citations (2) and (3) are concerned with drawn gear-crimped polyester yarn. Citation (1) discloses a process for gear crimping without any mention of a polyester yarn,

Citation (4) refers to a crimping process involving asymmetric heating of a polyester yarn, and finally Citation (5) deals with a process for false twist crimping of polyester yarn.

5. As Citation (2) refers to a process for making gear crimped nylon yarns from drawn or undrawn feed yarn, but also mentions the production of polyester yarns as an alternative, and clearly discloses yarns having a latent bulk as a result of the process described, it indisputably represents the closest prior art from which the invention as defined in Claim 1 sets out.
6. The appellants have admitted that the first part of Claim 1 is within the known art such as is represented by Citation (2). The subject matters of this claim differs from the yarn of the prior art merely by the (EK) and (KB) value ranges claimed.
7. The subject matter of the application as set out in Claims 1, 6, 7 and 8 proves to be novel vis-à-vis the prior art in view of the fact that there is no drawn gear-crimped polyester yarn with a latent bulk characterised by an initial crimp (EK) of at least 1.5% and a mechanical crimp stability (KB) of above 0% disclosed in any of the above mentioned citations nor do they reveal a process of gear crimping a drawable polyester yarn having a birefringence value in the range of  $32 \times 10^{-3}$  to  $125 \times 10^{-3}$  and wherein the forwarding of the yarn is effected under a post gear tension within the range of 0.15 to 0.50g per decitex of the drawn yarn.

8. According to the appellants' submissions, known gear crimped polyester yarns such as disclosed in citation (2), are produced from polyester feed yarns which are either drawn or undrawn. As a matter of fact, the properties of the yarns so produced either show an unacceptable low, i.e. negative, crimp stability (KB) for an undrawn feed yarn or an initial crimp (EK) of less than 0,4% even when using optimum post gear tension with a drawn feed yarn. The major disadvantages of such prior art yarn are unacceptable extremely low bulk and inadequate mechanical properties apparent in the finished fabric made from such yarn, and breaking of filaments in the process. Therefore, the commercial production of gear crimped polyester yarn has not been proved practical.

Furthermore, it is difficult to produce false twist yarns having a level of bulk and character comparable with that of gear crimped yarns on conventional false twist texturing machines, because those machines are designed to produce high bulk but different crimp shape, not having the properties claimed in Claim 1.

9. The problem of providing a new commercially acceptable gear crimped polyester yarn having improved bulk making it suitable for the production of fabrics displaying desirable aesthetic properties is said to be solved by a yarn as defined by the characterising portion of Claim 1.
10. Since independent protection of a product, i.e. a gear crimped polyester yarn is sought, the question of its patentability (Article 56 EPC) will have to be assessed by having regard to the cited prior art regardless of whether it was produced by the particular method of Claim 8 or by any other method achieving the same result.

- 11.1 The question now arises whether in the amount of crimp imparting the properties emphasised by the appellants there is an inventive concept.
- 11.2 In order to assess this properly, it is essential to investigate to what (KB) and (EK) values the yarn making process of citation (2) would lead to if instead of an undrawn or fully drawn nylon yarn 6.6 a polyester yarn of the same class were processed, i.e. whether such process would yield a commercially acceptable yarn.

In view of the fact that there is no specific mention of the particular post gear tension to be used with polyester yarn, the man skilled in the art would definitely not have any reason to depart from the optimising procedure of the post gear tension indicated in this citation in order to establish tensions which would yield the highest possible yarn bulk, as measured by the skein length test (the accepted test for measuring the amount of bulk in gear crimped polyamide yarn) and to select the optimum post gear tension.

According to the findings in Dr. Hogarth's Declaration the amount of bulk in the yarn and fabric produced in this manner from undrawn and drawn polyester yarn was low and commercially unacceptable. Even a test with partially oriented polyester yarn known to him as being used in other texturising methods did not yield better results.

- 11.3 Therefore, he concluded that there was no advantage to be gained in using such feed yarn and decided to abandon his attempts to make a drawn gear crimped polyester

yarn. He did so because he did not realise at the time that the accepted correlation for gear crimped polyamide yarns, i.e. the shorter the skein length, the greater the bulk of the fabric made from it, was not applicable and failed to pick out the optimum bulk with polyester yarns.

From this, it must be deduced that the person skilled in the art was misled by the accepted skein test procedure commonly used for polyamide yarns and this prevented him from finding the proper post gear tensions under which improved polyester yarn results such as claimed in Claim 1 could have been obtained by the prior art process of Citation (2).

- 11.4 It took one of the inventors to discover, as may be readily gathered from the Examples 10, 11 and the Comparative Examples F and G of the application, that the bulk for crimped polyester yarn correlates with the (EK) and (KB) values instead.

There is no doubt that this was the crucial observation on which the present invention is based and once having made this observation, it was possible to take the steps to arrive at the new inventive yarn which showed, when woven into a fabric and developed, not only the desirable level of bulk, avoiding the hard feel of prior fabrics or the rather bulky feel of "Crimplene" type fabric, but also a low glitter and sheen, a full and silk-like handle and good coverage, while preserving the desirable crease resistance of polyester fabrics. These are, indeed, unexpected properties. They are representatively expressed by the features of Claim 1. The ability to confer these non-predictable properties convincingly proves the absence of obviousness.

- 11.5 For all these reasons, the subject matter of Claim 1 does involve an inventive step and is allowable pursuant to Article 52(1) and Article 56 EPC.
- 11.6 Dependent Claims 2 to 5, constituting special ranges or embodiments of the invention in Claim 1, are thus also allowable.
- 11.7 Claim 6 is directed to the yarn obtained after development of the latent bulk into effective bulk exhibiting the level of bulk conferring the unexpected properties mentioned in section 11.4. Thus it is also allowable.
- 11.8 Claim 7 is inventive and thus also allowable, because the fabric made from the inventive yarn according to any of Claims 1 to 6 displays the surprising properties referred to in section 11.4.
- 12.1 Since in the case of an independent claim for a product the patentability of the latter has no necessary influence on the patentability of a claim specifying the process by which the product is obtained, the question now to be considered is whether having regard to the known prior art it would have been obvious to the person skilled in the art to arrive at the process claimed in Claim 8.
- 12.2 Citation (2) disclose a gear crimping process for either undrawn or drawn polyamide (nylon) feed yarn. The yarn obtained from undrawn yarn showing unsatisfactory low crimp, while the yarn produced from an undrawn yarn with a post gear tension of 0.39 g/decitex yields an optimum skein length test figure. The citation also refers to the most obvious supply yarns and further mentions inter alia and without exemplification, the use of a polyester

yarn. Indeed, it was natural from the teachings of this citation that the person skilled in the art would proceed with an undrawn polyester feed yarn, but he would certainly not be expected to accept the results obtained with a post gear tension suitable for obtaining optimum results with nylon feed yarn as a guidance for processing polyester feed yarn. Thus he would undoubtedly proceed to optimise the process conditions further by means of the customary skein length tests, which as appellants have shown, would inevitably lead to much higher post gear tensions for polyester feed yarns. Therefore, it cannot be deduced from citation (2) that the same post gear tension value recommended for processing nylon feed yarn can indiscriminately be used in the processing of polyester yarn. The same reasoning holds true for the gear crimp process disclosed in citation (1), which is even more remote from the inventive process due to the lack of any mention of polyester yarn and being no more significant regarding post gear tension recommended therein, whereas citation (3) is likewise more remote, as the post gear tensions indicated are all outside the range specified in Claim 8.

- 12.3 Assuming that the person skilled in the art may look around for a solution of the problem he is called upon to resolve in closely related fields of art, such as polyester crimping processes different from gear crimping as disclosed, e.g. in Citation (5) or (4), then the question has to be examined is whether therein he would find the teachings that combined with those of citation (2) could possibly lead to the invention.

This, however, cannot be answered affirmatively for the following reasons:

Although citation (5) concerns a false twisting process for imparting crimp, by means of a false twisting device and nevertheless teaches the use of partially oriented (drawable) polyester feed yarn having a birefringence of maximum 0.04, there is no indication nor hint whatsoever as to the selection of values of the post twisting device tension suitable for processing such yarn and the person skilled in the art would have no reason to depart from the too high post gear tension obtainable from citation (2).

Hence, the combining of the teachings of citations (2) and (5) still would not possibly lead to a process equal or similar to that of Claim 8. This conclusion also applies to combining Citations (2) and (4), the latter likewise using no gear crimping device at all and thus inevitably lacks any indication as to the selection of properly applicable post gear tensions.

- 12.4 Moreover, the obvious combination of the post gear tension of citation (2) with the birefringence values given in citations (5) or (4) yet leads away from the invention because the skein length optimisation used in the art up to the time of the invention would definitely lead to the use of much higher post gear tensions for the treatment of polyester yarns than those proposed by the present invention. This in turn would entail the crimp to assume an edge crimp rather than true gear crimping character, yielding no useful bulk when developed in the fabric. In order to proceed from the known art to the present invention, one would be compelled not only to modify the orientation of the feed yarn from drawn or undrawn yarn to a partially drawn yarn within the birefringence range claimed but, in addition, to



select the proper post gear tension by optimisation in taking advantage of the DIN 53840 test. In particular the post gear tension of 0.15 to 0.5 g/decitex of drawn yarn does not represent a value that would have been arrived at by the skilled person.

Consequently, the parameters relevant to the claimed process, i.e. the birefringence and post gear tension parameters, although known individually in crimped yarns, are not known or suggested to be commonly used in the process of making gear crimped polyester yarns and the selected ranges produce the surprising effect of improved latent bulk in gear crimped polyester yarns.

As far as the claimed birefringence and post gear tension ranges are concerned the Board sees no reason to restrict these ranges to those yielding the maximum results. The surprising technical effect which supports the patentability of the subject matter of claim 8 does not occur only at the maximum figures of the specified (KB) and (EK) values, as the Examples 1 to 14 set forth in the application clearly show.

12.5 For these reasons, the subject matter of Claim 8 is not obvious to the skilled person. Therefore, the process claim 8 does involve an inventive step, and is allowable pursuant to Article 52(1) and Article 56 EPC.

13. Claims 9 to 11 constitute special process variants of the invention in claim 8 and are thus also allowable.

14. The background art acknowledged by the appellants in the introductory portion of the description on page 1 of the application by reference to British Patent 984 922 sufficiently reflects the closest prior art dealt with during the present procedure (Citation 2), because the salient features disclosed in both publications are substantially in agreement. Therefore, the description as filed does not require amendment in this respect and hence it meets with the requirements of Rule 27 EPC.
15. The request of the appellants to refer the Appeal as a whole to the Enlarged Board of Appeal pursuant to Article 112(1)(a) EPC, is rejected as misconceived. Only questions of law, isolated from the facts of the case, could be so referred and, in the opinion of the Board, no risk of non-uniform application of the law exists in the present case.
16. No application has been made for reimbursement of the appeal fee in pursuance of Rule 67 EPC and it is not considered that the circumstances of the case would justify the reimbursement.

For these reasons it is decided that:

The decision of the Examining Division 121 of 28 December 1981 is set aside.

The case is remitted to the first instance with the order to grant a European Patent on the basis of the following documents :

Description pages 1 - 12 as filed;  
 Drawing sheet 1/1 as filed;  
 Claims 1 to 11 received on 19 July 1983.

The Chairman:

*[Handwritten signature]*

The Registrar:

*[Handwritten signature]*  
 .../...

*RF*