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**Datasheet for the decision
of 27 October 2021**

Case Number: T 2931/18 - 3.3.03

Application Number: 12764969.7

Publication Number: 2692913

IPC: D01F6/62, D01F6/84, D06M11/79,
D06M13/292, D06M101/32,
D02J13/00

Language of the proceedings: EN

Title of invention:
LIQUID CRYSTAL POLYESTER FIBERS AND METHOD FOR PRODUCING SAME

Patent Proprietor:
Toray Industries, Inc.

Opponent:
Müller-Boré & Partner
Patentanwälte PartG mbB

Relevant legal provisions:
EPC Art. 123(2), 14(2), 70(2), 123(3), 83, 54, 56
EPC R. 7

Keyword:

Amendment does not extend beyond the content of the
application as filed - translation into official language of
the EPO brought into conformity with the application as filed
Amendments - broadening of claim (no)
Sufficiency of disclosure - (yes)
Novelty - (yes)
Inventive step - (yes)



Beschwerdekammern

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Case Number: T 2931/18 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 27 October 2021

Appellant:

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Decision under appeal:

**Interlocutory decision of the Opposition
Division of the European Patent Office posted on
19 October 2018 concerning maintenance of the
European Patent No. 2692913 in amended form.**

Composition of the Board:

Chairman

D. Semino

Members:

F. Rousseau

C. Brandt

Summary of Facts and Submissions

- I. European patent No. 2 692 913 was granted on European patent application No. 12764969.7, originally filed as International Patent Application PCT/JP2012/056247 at the Japanese Patent Office in the Japanese language and published under WO 2012/132851.
- II. The appeal lies from the interlocutory decision of the opposition division posted on 19 October 2018 according to which said European patent as amended according to Auxiliary Request 1 met the requirements of the EPC. The documents of Auxiliary Request 1 were claims 1 to 13 filed with letter of 25 September 2017, corresponding to those of the patent as granted, pages 2-18 and 20-41 of the specification and page 19 of the description filed with letter of 25 September 2017. The contested decision was also based on the patent as granted as the Main Request.
- III. Claim 1 of the granted patent reads as follows:
- "A liquid crystalline polyester fiber exhibiting a running tension fluctuation range (R) of 5 cN or less and an oil adhesion rate of 3.0 wt% or less, which is obtainable by a method which comprises subjecting a yarn prepared by melt spinning a liquid crystalline polyester to a solid-phase polymerization after applying inorganic particles (A) and a phosphate-based compound (B) to said yarn, wherein the running tension fluctuation range (R) is determined by method A as described herein and the oil adhesion rate is determined by method D using sodium dodecyl benzene sulfonate as described herein."

Claims 2 to 7 were dependent claims of claim 1. Claims 8 to 12 defined methods of producing a liquid crystalline polyester fiber as claimed in any one of claims 1 to 7. Claim 13 was directed to a mesh woven fabric comprising the liquid crystalline polyester fiber according to any of claims 1 to 7.

IV. The decision was based inter alia on the following evidence:

E1: WO 2008/105439
E1a: EP 2 123 807 A1
E2: JPH05-302218 A
E2a: Machine translation in English of E2
E3: JPS59-179818 A
E3a: Machine translation in English of E3
E3b: Human translation in English of E3
E4: JP 2674062 B2
E4a: Partial translation in English of E4
E5: JP 2010-248681 A
E5a: Machine translation in English of E5
E6: JP 2009-228177 A
E6a: Machine translation in English of E6
E7: page 38 of WO 2012/132851
E8: "Annex 1: Experimental Report" submitted by the proprietor with letter of 25 September 2017

V. The reasons for the contested decision which are relevant for the appeal can be summarized as follows:

(a) Paragraph [0150] of the patent in suit defined that method D for determining the amount of oil adhesion included a drying step at 60°C for 60 minutes. The application as filed in its original language, however, showed that the corresponding drying step

described in paragraph [0159] was performed for 10 minutes. Paragraph [0150] therefore extended beyond the content of the application as filed and the Main Request was not allowable.

- (b) Auxiliary Request 1 differed in substance from the Main Request in that in paragraph [0150] of the specification the drying time had been changed from 60 minutes to 10 minutes. This amendments found a basis in paragraph [0160] of the application as filed.

It could not be ascertained whether the concentration of sodium dodecylbenzene sulfonate of the aqueous solution used in experimental report E8 to clean the fiber was the same as that prescribed in paragraph [0150] of the specification, because that information was not clearly provided in the specification, possibly due to an improper translation of the original text. However, E8 was sufficient to demonstrate that no significant difference in the oil absorption rate occurred when the drying time was changed from 60 minutes to 10 minutes, since E8 showed that the oil absorption rate was already constant after 1 minute drying time.

On that basis the scope of claim 1 was not affected by the amended definition of the drying time in paragraph [0150], meaning that claim 1 met the requirement of both Articles 123(2) and 123(3) EPC.

- (c) The ambiguity in paragraph [0150] of the specification concerning the amount of sodium dodecylbenzene sulfonate to be used for measuring the oil adsorption rate had not been shown to

result in the skilled person being unable to determine that parameter. The opponent's objection that the invention was insufficiently disclosed was therefore not successful. It was at best an issue of clarity.

- (d) E1 and E1a did not describe that a phosphate-based compounds was applied to the yard. E1 and E1a did not disclose either the application of inorganic particles and an oil adhesion rate below 3.0 wt% in combination. Moreover a running tension fluctuation as defined in claim 1 of auxiliary request was also not disclosed in E1 and E1a. The same hold true for E5. Novelty over each of E1, E1a and E5 was therefore acknowledged.
- (e) E3 disclosed the use of a solid state polymerization step in the presence of a phosphate-based compound and inorganic particles. Reference Example 3 of the opposed patent, however, showed that the mere use of these steps was not sufficient to prepare fibers exhibiting the oil absorption rate and the running tension fluctuation range defined in claim 1 of Auxiliary Request 1. Novelty over E3 was therefore given.
- (f) As regards inventive step, the fibers of E1 disclosed in Tables 8 to 10 which had an oil adhesion rate of less than 3.0 wt%, but on which no inorganic particles had been applied represented the most suitable starting point for assessing inventive step. Despite the fact that the fibers of Comparative Example 4 in Table 7 of the patent in suit were treated with a polydimethylsiloxane oil as in E1, said fibers could not be seen as representative of the teaching of E1, since they

significantly differed from those prepared in E1. Since no technical effect had been shown to be associated to the differences between the claimed fibers and E1, the objective technical problem solved over the closest prior art resided in the provision of an alternative fiber to the one already known from E1. Neither E2 nor E4 concerned the production of liquid crystal polyester fibers and E3 was only concerned with reducing fusion of fibers upon heat treatment. In addition none of the cited documents suggested limiting the running tension fluctuation rate to 5 cN or less. The claimed matter was therefore not obvious when starting from E1 as the closest prior art.

- (g) Starting from E5 as the closest prior art, the same reasoning as starting from E1 applied since the fibers of claim 1 differed in the same way from E1 and E5.

- (h) E6 was also considered as a possible starting point for assessing inventive step. The fibers of claim 1 also differed from those of E6 in that their running tension fluctuation range was 5 cN or less, their oil adhesion rate was 3.0 wt% or less and a phosphate-based compound was applied to the yarn before solid phase polymerization. In the absence of a comparative example representative of the teaching of E6, the objective technical problem solved over E6 also resided in the provision of an alternative liquid crystal polyester fiber. For the same reasons as provided in respect of E1 as the closest prior art the claimed subject-matter was not suggested by the prior art.

(i) The subject-matter of the claims of Auxiliary Request 1 therefore involved an inventive step.

(j) The patent as amended according to Auxiliary Request 1 met therefore the requirements of the EPC.

VI. The opponent (appellant) lodged an appeal against the above decision, the statement of grounds of appeal being submitted with letter of 8 February 2019.

VII. The patent proprietor (respondent) replied to the statement of grounds of appeal with a letter of 25 June 2019 requesting the dismissal of the appeal. Auxiliary requests designated as MRy, AR1, AR1y, AR2, AR2z, AR3, AR3y, AR4, AR4y, AR5, AR5z, AR6, AR6y, AR7, AR7y, AR8, AR8z, AR9, AR9y, AR10, AR10y, AR11, AR11z, AR12, AR12y, AR13 and AR13y were also submitted with said letter. Auxiliary Request "MRy" was indicated to correspond to the Main Request with an amended page 19 "ARy" in which paragraph [0150] had been amended to define that the ultrasonic wave cleaning was performed at room temperature. The wording of the other requests is not relevant for the present decision.

VIII. Amended page 19 of the description labelled "ARy - description 19" in accordance with Auxiliary Request "MRy" which had been inadvertently omitted with the reply to the statement of grounds of appeal was submitted with letter of 26 June 2019.

IX. In preparation of the oral proceedings the Board issued a communication dated 10 August 2021 in which the Board's gave their preliminary opinion that the present Main Request was not allowable for the sole reason that

paragraph [0150] of the description did not comply with the requirement of Article 123(2) EPC.

- X. The appellant withdrew their request for oral proceedings with a letter dated 3 September 2021.

- XI. With letter of 22 October 2021, the respondent withdrew their requests for oral proceedings and their Main Request, i.e. dismissal of the appeal. The respondent maintained their remaining requests, Auxiliary Requests MRy consisting of the claims of the patent as granted, alongside the description of the patent as granted except for page 19 labelled "ARy" submitted with letter of 26 June 2019, being promoted new Main Request.

- XII. The oral proceedings were thereafter cancelled by the Board as not deemed necessary.

- XIII. The appellant's submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They are essentially as follows:
 - (a) The replacement in paragraph [0150] of the specification of a drying time of 60 minutes by a drying time of 10 minutes which is used for determining W_1 was contrary to the requirements of Article 123(3) EPC.

 - (b) The subject-matter of claim 1 of the opposed patent lacked sufficiency of disclosure.

 - (c) The subject-matter of claims 1 to 7 and 13 of the opposed patent lacked novelty over each of E1, E1a and E5.

- (d) The subject-matter of claims 1 to 13 of the opposed patent was anticipated by E3.
- (e) The subject-matter of the opposed patent did not involve an inventive step over each of documents E1, E1a, E5 and E6 taken as the closest prior art in combination with any of E2, E3 and E4.
- (f) It was also submitted as a separate objection that the preparation of fibers exhibiting a running tension fluctuation range of 5 cN or less and an oil adhesion rate of 3.0 wt% required the use of a cleaning step which was not defined in claim 1 of the opposed patent. On that basis the object of the invention as defined in paragraph [0013] of the specification could not be achieved. Accordingly, the patent did not involve an inventive step over the whole scope claimed.

XIV. The respondent's submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) Paragraph [0150] of the specification as amended in page 19 of the specification labelled "ARy" was in keeping with the requirements of Article 123(2) and (3) EPC.
- (b) The subject-matter of claim 1 of the opposed patent was sufficiently disclosed to be carried out by the skilled person.
- (c) Each of document E1, E1a, E3 and E5 had not been shown to anticipate the subject-matter of claim 1 of the opposed patent. A running tension

fluctuation range (R) of 5 cN or less was the result of various process steps recommended in the patent in suit and employed in its Examples. It was undisputed that those documents did not explicitly describe a running tension fluctuation range (R) of 5 cN or less. They also did not describe the steps recommended in the patent in suit for achieving such result. Novelty of the subject-matter of all claims had therefore to be acknowledged.

(d) The subject-matter of claim 1 was not obvious starting from either of documents E1, E1a, E5 and E6 taken as the closest prior art.

XV. The appellant requested that the decision under appeal be set aside and the patent in suit be revoked.

XVI. The respondent requested that the contested decision be set aside and the patent be maintained on the basis of the documents of the Main Request consisting of the claims of the patent as granted, alongside the description of the patent as granted except for page 19 labelled "ARy" submitted with letter of 26 June 2019, or in the alternative on the basis in the following order of any of the auxiliary requests designated in the reply to the statement of grounds of appeal (letter of 25 June 2019) as AR1, AR1y, AR2, AR2z, AR3, AR3y, AR4, AR4y, AR5, AR5z, AR6, AR6y, AR7, AR7y, AR8, AR8z, AR9, AR9y, AR10, AR10y, AR11, AR11z, AR12, AR12y, AR13 and AR13y.

Reasons for the Decision

Main Request

Article 123(2) EPC

1. Taking into account that Euro-PCT applications are deemed by Article 153(2) EPC to be equivalent to a regular European application and the principle that they thus must be treated in the same manner, the provisions of Rule 7 EPC, Article 70(2) EPC and Article 14(2) EPC, second sentence equally apply to the present patent.
- 1.1 It is undisputed that the translation of the application as filed submitted upon entry into the European phase with letter of 24 September 2013 is not in conformity with the original text of the application (i.e. International Patent Application PCT/JP2012/056247) as far as its paragraph [0159] is concerned. It is in this respect undisputed that the drying time for determining W_1 used for measuring the amount of oil adhesion in accordance with method D was defined to be 60 minutes for the translation instead of 10 minutes in the original Japanese text. It is also not contested that the translated text omitted to define that the ultrasonic wave cleaning is carried out at room temperature.
- 1.2 The respondent submitted with an amended page 19 of the specification labelled "ARy" a revised version of paragraph [0150], corresponding to paragraph [0159] of the original text, in which the translation was brought into conformity with the application as filed.

- 1.3 In the absence of any objection that the text of the Main Request extends beyond the content of the application as filed, the Board is satisfied that the Main Request meets the requirement of Article 123(2) EPC.

Preliminary remark - Meaning of method D

2. Claim 1 defines that "the oil adhesion rate is determined by method D using sodium dodecyl benzene sulfonate as described herein". The meaning of method D plays a pivotal role for examining most of the objections raised by the appellant. It is therefore appropriate to address its meaning at this juncture.

- 2.1 Claim 1 as such does not specify which type of oil is meant to be measured by method D. It also does not provide a definition of the term "method D" which does not appear to have a recognized meaning for the skilled person. Accordingly, the meaning of method D can only be interpreted having recourse to the specification, whose paragraphs [0052], [0068], [0126], [0150] and [0151] are relevant for this purpose.

- 2.2 Method D as defined in paragraph [0150] of the patent as granted comprises:

- A drying step at 60°C for 10 minutes of a fiber of 100 ± 10 mg (i.e. the sample to be measured),
- Measuring the weight (W_0) of said dried fiber,
- Dipping said fiber in a solution of sodium dodecylbenzene sulfonate in water whose concentration is defined,
- Subjecting the fiber to an ultrasonic wave cleaning for 20 minutes (now specified to be carried out at room

temperature in conformity with the original Japanese text),

- Rinsing the fiber,

- Measuring the weight (W_1) of said fiber after a drying step at 60°C for 60 minutes (now amended as to read 10 minutes in conformity with the original Japanese text).

2.3 Having regard to paragraph [0052] the oil adhesion rate as determined using method D is "a total adhesion rate of residual solid-phase polymerization oil agent and finishing oil agent" remaining on the fibers "after the cleaning".

2.4 The solid-phase polymerization oil agent and the finishing oil agent refer to oils used for the synthesis of the fibers (paragraphs [0002], [0012], [0068]). The solid-phase polymerisation oil agent comprises the inorganic particles (A) and the phosphate based compound (B) defined in claim 1 (paragraphs [0102] and [0103]).

2.5 A cleaning step is used for the present invention not only for carrying out measurement method D, but also for the synthesis of the fibers. The term "cleaning" addressed in paragraph [0052] refers to one of the steps carried out for producing the fibers, i.e. the step which is operated to remove the solid-phase polymerisation oil agent before a finishing oil agent is applied (see paragraphs [0121] to [0126]). This is confirmed by Example 1 in which such a cleaning step in the production of the fibers using a nonionic-anionic surfactant (i.e. a surfactant different from that used for the cleaning step of method D) is performed (paragraph [0178]), which step is followed by a rinsing step (paragraph [0179]), a heating step and a step of

applying a finishing oil on the fibers (paragraph [0180]). This sequence of steps is in line with the general teaching concerning the preparation of the fibers which is provided in paragraphs [0121] to [0135] of the specification.

Article 123(3) EPC

3. As indicated above the text of the Main Request differs from that of the patent as granted in that in paragraph [0150] of the specification the ultrasonic wave cleaning is specified to be performed at room temperature and the drying time for determining W_1 is defined to be 10 minutes instead of 60 minutes. It is submitted by the appellant that both amendments extend the scope of the patent

3.1 Concerning the first amendment, the appellant submits that the temperature used during ultrasonic wave cleaning has a strong effect on the measured oil adhesion amount, meaning that the adhesion amount obtained using ultrasonic cleaning at room temperature as defined for the present request is different from that measured when performing said cleaning at random temperature in accordance with the patent as granted. Even if accepting to the benefit of the appellant that for an ultrasonic wave cleaning time of 20 minutes the amount of oil adhesion measured would be dependent on the temperature used for said cleaning step, for which no evidence was provided, the selection of one specific temperature within conceivable temperatures for that step would only result in an amount of oil adhesion measured which lies within the various values obtainable by varying the ultrasonic cleaning temperature. Accordingly, the objection based on the first amendment cannot convince.

3.2 Concerning the seconde amendment the appellatant submits that an apparent oil adhesion rate of 3 wt% or less as determined by a method in which the drying step is carried out for 10 minutes could correspond to an oil adhesion rate of more than 3 wt% when carrying out the measuring method using the same drying step, but for 60 minutes as defined in the patent as granted, meaning that fibers which did not fall under the scope of the patent as granted would now fall within the ambit of operative claim 1.

Moreover, the appellatant argues that Experimental Report E8 submitted by the respondent before the opposition division to demonstrate that a change of said drying step from 60 minutes to 10 minutes has no impact on the oil adhesion rate measured by using method D, cannot support the respondent's position, since E8 concerns a cleaning step performed with a concentration of sodium dodecylbenzene sulfonate different from that prescribed in the specification for method D.

3.3 E8 submitted by the respondent before the opposition division shows that under the conditions used for the cleaning step performed before measuring W_1 the oil adhesion rate is identical for any drying time above 1 minute. That drying step is understood by the skilled person as a step allowing the sole evaporation of water which remains on the fiber following the rinsing step performed in method D so that no water is weighted when measuring W_1 .

3.4 The definition in paragraph [0150] of the granted patent of the concentration of surfactant to be used for the cleaning solution, namely "*a solution prepared by adding sodium dodecylbenzene sulfonate to water of*

100 times or more of the fiber weight at 2.0 wt% relative to the fiber weight" is ambiguous. It is not apparent to the Board that any of the interpretations of said definition proposed by the parties ("*a 2.0 wt% solution sodium dodecylbenzene sulfonate in water*" for the respondent and "*a dipping solution prepared by using 2.0 wt% of sodium dodecylbenzene sulfonate with respect to the weight of the fibers*" for the appellant would be certainly understood by the skilled person to represent what has been intended by the inventors of the present invention.

3.5 Even if the concentration of surfactant in the cleaning solution used in method D should be understood to be much lower than that used in E8, as argued by the appellant, it is not apparent to the Board how such a difference in concentration of the surfactant in the cleaning solution might significantly impact the amount of water present within or on the fiber after the rinsing step. No argument, let alone evidence was submitted in this respect by the appellant.

3.6 Even if for the sake of argument it were considered that the amount of rinsing water left before the drying step on the fibers were substantially affected by using a lower concentration of surfactant for the cleaning solution, it is also not apparent how this could lead to a different W_1 value considering that E8 shows that only one minute of drying is sufficient to vaporize an amount of water equivalent to 25% of the weight of the dried fiber (Experimental Result Set 2; Initial W_1 value). In the Board's opinion it is therefore unreasonable to assume that a lower concentration of surfactant for the cleaning solution would lead to an increase of the water take up after the rinsing step such that a subsequent drying step of 10 minutes would

be insufficient to also vaporize said hypothetical additional water take up.

- 3.7 The Board is therefore of the view that regardless of whether the amount of surfactant used in E8 is the same as that intended to be described in the specification, E8 demonstrate that a drying time of 10 minutes instead of 60 minutes at 60°C does not lead to different W_1 value and therefore to a different oil adhesion rate. In other words, amending the drying time from 60 minutes to 10 minutes does not result in the definition of fibers which were not encompassed by the definition of claim 1 as granted.
- 3.8 Accordingly, the objection that the Main Request contravenes the requirement of Article 123(3) EPC does not convince.

Sufficiency of disclosure

4. The appellant's objection that the invention is insufficiently disclosed to be carried out by a skilled person is based on the argument that claim 1 does not comprise a cleaning step to be performed after solid phase polymerization, which step is according to the appellant necessary to arrive at a fiber having a running tension fluctuation range of 5 cN or less and an oil adhesion rate of 3.0 wt% as required by claim 1.

The appellant is correct when arguing that a cleaning step is necessary to arrive at a fiber meeting the requirement of present claim 1, i.e. a fibre exhibiting a running tension fluctuation range of 5 cN or less and an oil adhesion rate of 3.0 wt%.

This argument, however, mirrors the teaching of the patent in suit which describes that this step is preferred and for which a detailed description is provided (paragraphs [0121] to [0125]). The decisive criteria concerning sufficiency of disclosure of an invention defined in terms of functional or parametric features is not whether the measures necessary to fulfil those functional or parametric requirements are defined in the claim under scrutiny, but rather whether those measures are taught in the patent in suit or known to the skilled person so that the skilled person is able to prepare what is claimed. As it is the case as indicated above, the Board concludes that the present invention has not be shown to lack sufficiency of disclosure.

Novelty

5. The appellant objects that the subject-matter of claim 1 lacks novelty over each of E1, E1a, E3 and E5.

Novelty over E1a/E1

6. E1a which was published before the priority date of the patent in suit is prior art under Article 54(2) EPC. It represents the translation (in English) of the earlier application E1 prescribed by Article 153(4) EPC. In the absence of any evidence that the text of E1 differs from that of E1a, the analysis made in respect of E1a also applies to the additional prior art E1.
 - 6.1 It is undisputed that E1a concerns the production of liquid crystalline polyester fibers (claim 1). The appellant's submission that paragraph [0159] of E1a also discloses that the final oil adhesion amount is preferably 0.1 wt% or more relative to the weight of

the fiber is also not contested, said amount being preferably 4 wt% or less to optimize "the running tension fluctuation range".

The appellant also argues that Ela additionally proposes for this purpose "to increase the strength and the uniformity of the fineness in the fiber lengthwise direction and to improve the abrasion resistance of the fiber" (paragraph [0006] of Ela). It is argued in essence that the patent in suit teaches that a cleaning step carried out to reduce the amount of oil adhesion to a level of at most 3 wt%, which includes the residue of solid-phase polymerization oil agent, is required in order to obtain "a running tension fluctuation range (R) of 5 cN or less", and that Ela also discloses that measure. It is in particular referred to the working examples shown in Tables 9 and 10 for which a level of oil adhesion after cleaning of 3.0 wt% or less is disclosed. The appellant concludes on that basis that "a running tension fluctuation range (R) of 5 cN or less" is implicitly disclosed in Ela.

6.2 In accordance with the case law of the Boards of Appeal the term "implicit disclosure" refers to a disclosure which any person skilled in the art would objectively consider as necessarily implied by the the explicit content, i.e. the direct and unambiguous consequence of what is explicitly mentioned (Case Law of the Boards of Appeal, 9th Edition 2019, I.C.4.3).

6.3 It is undisputed that a cleaning step is described in Ela as an appropriate measure to optimize the running tension fluctuation range, because it helps reducing the amount of solid-phase polymerization oil agent adhering onto the fibers. However, the mere indication in Ela that this document aims at optimizing "the

running tension fluctuation range" does not provide any disclosure that a range of 5 cN or less is achieved with the measures for the preparation of the fibers which are taught in that document.

- 6.4 Whereas the patent in suit teaches for the solid-phase polymerization to apply to the yarn a combination of inorganic particles (A) and a phosphate based compound (B) in order to achieve a running tension fluctuation range of 5 cN or less, E1a preferably recommends the use of a polydimethylsiloxane as the solid-phase polymerization oil agent (paragraphs [0079], [0138] and [0150]).

However, as indicated in paragraphs [0008] and [0010] of the patent in suit and shown by the technical evidence provided with its comparative Example 4 (paragraphs [0261] to [0264]) relied on by the respondent the solid-phase polymerization oil agent used in E1a undergoes cross-linking under solid-phase polymerisation conditions leading to the formation of a gel adhering to the fiber surface. This gelled product is however in contrast to the mixture of inorganic particles (A) and phosphate-based compound (B) not removed during the cleaning step carried out after the solid phase polymerization (see paragraph [0098] of the specification).

That gelled product is also not detected when measuring the amount of oil adhesion in E1a, since the measuring method comprises a cleaning step which is essentially the same as that used after the solid phase polymerization. In other words, the amount of oil adhesion determined in E1a does not include the amount of cross-linked polydimethylsiloxane produced during

the solid-phase polymerization step which still adheres to the fibers.

As indicated by the respondent, Comparative Example 4 of the patent in suit concerns a liquid crystalline polyester fiber which was obtained in the same manner as described in Example 1 except that, instead of the inorganic particles (A) and phosphate-based compound (B), a polydimethylsiloxane oil agent was used as a main component for the solid-phase polymerization. Accordingly, a comparison between Comparative Example 4 and Example 1, which only differ in the type of oil agent used, allows to conclude as pointed out by the respondent that the replacement for the solid phase polymerization of the polydimethylsiloxane oil agent by a mixture of inorganic particles (A) and phosphate-based compound (B) brings about a decrease of the running tension fluctuation range (Table 2 and Table 7). Whereas a running tension fluctuation range of 11.3 cN is obtained in Comparative Example 4, a range of 3.2 cN is obtained in Example 1. It is also noted that Comparative Example 4 concerns a fiber having a running tension fluctuation range of 11.3 cN, despite the fact of having an oil adhesion rate of 0.9 wt%. As explained above, this is due to the fact that the cross-linked polydimethylsiloxane adhered to the fibers and which is not removed by the cleaning step carried out in method D leads to an increased tension fluctuation.

- 6.5 On that basis, it cannot be concluded as submitted by the respondent that "a running tension fluctuation range (R) of 5 cN or less" which requires a combination of specific measures not described in E1a is implicitly disclosed in that document. Novelty of the fibers of operative claim 1 over E1a and E1 is therefore acknowledged.

Novelty over E3

7. Referring to the human translation in English of E3 (E3b) the appellant submits that the method steps used in Example 7 of E3 and in the opposed patent are the same. The appellant concludes on this basis that the liquid crystalline polyester fiber manufactured in said Example must have a running tension fluctuation range (R) of 5 cN or less and an oil adhesion rate of 3.0 wt% or less as defined in claim 1 of the patent in suit.

7.1 As pointed out in the Board's communication the method steps to which the appellant refers are understood in the light of the appellant's submissions to be those explicitly defined in claim 1 of the patent in suit. This was not contested. The appellant, however, did not provide any reasoning as to why a running tension fluctuation range (R) of 5 cN or less and an oil adhesion rate of 3.0 wt% are the inevitable result of the other features explicitly defined in claim 1 as granted. This is not apparent, in particular as the oil adhesion rate amount depends on the amounts of inorganic particles (A) and phosphate based compound (B) deposited on the fibers before the solid phase polymerization and the existence of a cleaning step following said polycondensation step.

7.2 Example 7 of E3 to which the appellant refers describes a solution of two compounds falling within the definition of compounds (A) and (B) of operative claim 1 which solution is brought into contact with a liquid crystalline polyester fiber before carrying out a heat treatment for several hours at a temperature up to 300°C in a nitrogen flow. There is no disclosure of the amount of compounds (A) and (B) on the fibers either

during this heat treatment or remaining on it after said step has been carried out. A cleaning step is also not described in E3, as submitted by the respondent.

- 7.3 Accordingly, the appellant failed to show that the measures taken in E3 would inevitably result in the production of fibers having running tension fluctuation range (R) of 5 cN or less. Novelty of the fibers of operative claim 1 over E3 is also therefore acknowledged.

Novelty over E5

8. The lack of novelty objection based on E5 is essentially based on the same reasoning as that provided for arguing lack of novelty over E1/E1a, namely that E5 provides measures for reducing/optimizing the fluctuation tension so that a running tension fluctuation range (R) of 5 cN or less is inherently described in said document, in particular as E5 teaches in paragraph [0053] an amount of adhesive oil left on the surface of the polyester fibers which is more preferably smaller than 0,5 wt%. The appellant also points out that the method used in E5 to measure the oil adhesion rate which is described in paragraph [0154] of that document is similar to that used in the patent in suit.

- 8.1 As already indicated in above point 6.4, there is no necessary correlation between oil adhesion rate values of 3.0 wt% or less and a running tension fluctuation range as defined in operative claim 1. This is because the oil adhesion rate does not necessarily represent a measure of the amount of product originating from the solid phase polymerisation oil which remains on the fibers after the ultrasonic cleaning step, which

product has an influence on the running tension fluctuation range. Such a correlation does not exist as shown above in relation to E1a/E1 when a polydimethoxysilane oil is used, which oil is preferably used in E5 as is disclosed in paragraph [0102] and paragraph [0154] cited by the appellant in support of their objection.

8.2 The Board therefore concludes that E5 has not been shown to disclose a liquid crystalline polyester fiber having "a running tension fluctuation range (R) of 5 cN or less". Novelty of the fibers of operative claim 1 over E5 is therefore given.

9. Consequently, the subject-matter of claim 1 as granted and that of claims 2 to 13 whose features necessarily comprise those of claim 1 meet the requirement of novelty.

Inventive step

10. The appellant objects that the subject-matter of claim 1 does not imply an inventive step over each of documents E1, E1a, E5 and E6 taken as the closest prior art. The parties agree that each of those documents can be considered as a suitable starting point for assessing inventive step.

E1a/E1 as closest prior art and distinguishing feature

11. The appellant's objection is based on the argument that a running tension fluctuation range of 5 cN or less as required by operative claim 1 is also met by the fibers of E1a/E1. This, however, has not been shown to be correct as indicated in above points 6.1 to 6.5. Already on that basis, the appellant's objection which

does not take into account that a running tension fluctuation range of 5 cN or less constitutes a distinguishing feature over the disclosure of E1a/E1 fails to convince.

It can be taken from above point 6.4 that the amount of oil adhesion determined with method D does not represent a distinguishing feature of the liquid crystalline polyester fibers of operative claim 1 over the fibers obtained in E1, since it does not reflect the amount of cross-linked polydimethylsiloxane which adhere to the fibers despite the cleaning step performed after the solid phase polymerization.

Moreover, claim 1 does not require the presence of a residual amount of inorganic particles (A) or of the phosphate-based compound (B) on the fibers, either explicitly, nor implicitly as those compounds can be entirely removed during the cleaning step carried out after the solid phase polymerization. However, the use of said compounds for the solid-phase polymerization, as defined by the process feature of claim 1, is necessary to achieve a running tension fluctuation range of 5 cN or less, which therefore constitutes the sole distinguishing feature over the disclosure of E1a/E1.

Problem successfully solved

12. As indicated in above point 6.4 the patent in suit demonstrates that the polydimethylsiloxane oil applied to the yarn in E1 undergoes cross-linking under solid-phase polymerisation conditions leading to the formation of a gel adhering to the fiber surface. This gelled product which is however not removed by the cleaning step carried out after the solid-phase

polymerization accumulates on the various apparatus parts used for the post processing steps of the fibers, leading to product contamination or yarn breakage by increased tension fluctuation (paragraph [0003] of the patent in suit and Comparative Example 4, paragraph [0264] and Table 7 on pages 39 and 40).

As can be also taken from above point 6.4 the patent in suit contains with Example 4 and Comparative Example 1 conclusive experimental evidence showing that, all other things being equal, the replacement of the polydimethylsiloxane oil by a mixture of inorganic particles (A) and a phosphate-based compound (B) brings about a decrease of the running tension fluctuation range, i.e. down to a value of 5 cN or less as defined in operative claim 1.

As shown by the same comparison (Table 2 and Table 7) said replacement leads also to an improved processability, weavability and quality of the woven fabric. This also is understood to be caused by the suppression of the cross-linked polydimethylsiloxane oil adhering on the surface of the fibers, whereas the oil adhesion rate is kept in a low range as defined in operative claim 1, which is the consequence of a necessary cleaning step to remove excess of the mixture of inorganic particles (A) and a phosphate-based compound (B).

On that basis it appears credible as submitted by the respondent that the problem successfully solved by the fibers of claim 1 over E1a/E1 is the provision of liquid crystalline polyester fibers which exhibit less scum contamination, have improved weavability and are less prone to yarn breakage. In the absence of evidence

of the contrary, the Board accepts that the problem has been solved.

Obviousness of the solution

13. The appellant argues that the claimed solution would be obvious in order to provide an alternative fiber, reference being made to E2, E3 and E4. However, the problem successfully solved by the fibers of claim 1 over E1a/E1 is more ambitious and resides as indicated above in the provision of liquid crystalline polyester fibers which exhibit less scum contamination, have improved weavability and are less prone to yarn breakage. No argument was however submitted by the appellant as to why the skilled person would find a suggestion in the prior art that the fibers of operative claim 1 could solve that problem. In particular, no argument has been presented as to why it would have been obvious for the skilled person to prepare liquid crystalline polyester fibers exhibiting a running tension fluctuation range of 5 cN or less which is a requirement of operative claim 1.
14. On that basis, the subject-matter of claim 1 has not been shown to be obvious having regard to the state of the art.

Document E5 as closest prior art

15. The inventive step objection raised by the appellant is essence the same as that raised starting from E1a/E1 as the closest prior art. It is also based on the argument that a running tension fluctuation range of 5 cN or less as required by operative claim 1 is also met by the fibers described in E5. This, however, is not true as pointed out in above points 8 to 8.2, meaning that

the appellant's objection cannot be successful. Moreover, having regard to said distinguishing feature and for the same reasons as indicated in relation to E1/E1a taken as the closest prior art the Board concludes that the problem successfully solved by the subject-matter of claim 1 over E5 is the provision of fibers which exhibit less scum contamination, have improved weavability and are less prone to yarn breakage. As can be taken from above point 13, the appellant did not show that it would have been obvious for the skilled person that the fibers of operative claim 1 would solve such a problem. The Board therefore concludes that the subject-matter of claim 1 involves an inventive step over E5 as well.

Document E6 as closest prior art

16. E6 has been argued by the appellant to disclose fibers which inherently fulfil a running tension fluctuation range of 5 cN or less, which however is disputed by the respondent. No reasoning has been provided in support of the appellant's allegation. As in E1a/E1 and E5 the solid-phase condensation of the fibers prepared in E6 takes place in the presence of a polydimethylsiloxane oil, which compound is used in E6 alongside with inorganic particles (see abstract, claim 1 and paragraph [0031]). For the same reasons as provided above, and considering that it is credible that the polydimethylsiloxane oil will also undergo crosslinking during the solid-phase condensation step performed in E6, the Board concludes that "a running tension fluctuation range (R) of 5 cN or less" constitutes a feature distinguishing the fibers of operative claim 1 from those obtained in E6. On that basis the reasoning provided for the objection based on E1/E1a as the

closest prior art and the resulting conclusion equally apply to the objection based on E6.

17. Since the fiber of claim 1 of the Main Request is considered to involve an inventive step over each of the fibers of E1/E1a, E5 and E6, the same applies to the subject-matter of the additional claims of that request whose features also incorporate those of claim 1.

18. Regarding the separate objection that the absence in claim 1 of any definition for a cleaning step meant that the the patent did not involve an inventive step over the whole scope claimed, the Board observes that the achievement of a running tension fluctuation range of 5 cN or less which is a feature of claim 1 implies that such cleaning step was performed (see above point 4, second paragraph). Already on that basis this separate objection cannot convince. More importantly, this objection is not made having regard to the state of the art. Accordingly, the appellant's reasoning is not suitable to demonstrate any obviousness of the claimed invention which as required by Article 56 EPC is to be judged having regard to the state of art.

Conclusion

19. In the absence of additional objections against the subject-matter of the Main Request, that request is considered to be allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the following documents:

Claims 1 to 13 of the patent as granted,

description pages 2-18 and 20-41 of the patent as granted,

and page 19 of the description labelled "ARy" submitted with letter of 26 June 2019.

The Registrar:

The Chairman:



A. Pinna

D. Semino

Decision electronically authenticated