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Datasheet for the decision of 22 January 2009

Case Number: T 0819/06 - 3.4.02

Application Number: 01114263.5

Publication Number: 1267189

IPC: G02B 6/44

Language of the proceedings: EN

Title of invention:
Optical cable with improved tracking resistance

Applicant:
Borealis Technology Oy

Opponent:
-

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (yes) - formulation of the objective problem"

Decisions cited:
T 0218/84

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0819/06 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 22 January 2009

Appellant: Borealis Technology Oy
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Representative: Kador & Partner
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 13 December 2005 refusing European application No. 01114263.5 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
M. J. Vogel

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 01114263.5 (publication No. 1267189).

II. In the decision under appeal the examining division referred to the following documents

D1 : WO-A-9305424
D2 : WO-A-9703124
D3 : US-B1-6180721
D4 : US-B1-6185349

and held that the subject-matter of claim 1 of the application as filed did not involve an inventive step (Article 56 EPC 1973) in the light of the disclosure of document D1 and the teaching of any of documents D2, D3 and D4.

III. With the statement setting out the grounds of appeal the appellant requested setting aside of the contested decision and the grant of a patent. Oral proceedings were also requested on an auxiliary basis.

IV. In an annex to the summons to oral proceedings the Board noted, among other points, that there was no evidence or technical argument on file in support of the contention of the appellant that the reduced amount of carbon black would contribute, in combination with the remaining claimed features, to an improvement of the tracking resistance of the claimed cable; in

particular, the examples of the application would not appear to be sufficient in this respect.

In reply to the summons, the appellant filed the following document:

D6 : "Silane crosslinked polyethylene insulation for cost effective overhead cables", R. Carlsson *et al*.; Proceedings of the 51st IWCSF/FOCUS International Wire & Cable Symposium, 18-21 November 2002, Lake Buena Vista, Florida (US); pages 540 to 547.

V. During the oral proceedings the appellant submitted a new complete set of application documents as recorded in the order below and requested the grant of a patent on the basis of these application documents.

At the end of the oral proceedings the Board gave its decision.

VI. Claim 1 amended according to the request of the appellant reads as follows:

"Optical cable with improved tracking resistance comprising at least one optical fibre and an outer sheath which comprises a polymeric material, wherein the polymeric material forms a matrix for the sheath and is consisting of a multimodal olefin polymer obtained by coordination catalyzed polymerization, and in that the total composition of the sheath comprises 15-40 % by weight of magnesium hydroxide and/or aluminium hydroxide and 0.01-0.9 % by weight of carbon black."

Dependent claims 2 to 13 all refer back to claim 1.

VII. The arguments submitted by the appellant in support of its requests are essentially the following:

The invention is directed to an outer sheath for an optical cable having simultaneously good tracking resistance and mechanical properties. As disclosed in the application and as outlined in particular in the introductory part of the description, the main focus of the application is on the improvement of the tracking resistance and, except for this improvement, there is no data in the application which would show an improvement in the wide range of properties considered by the examining division. Thus, although the formulation of the objective problem should not be confined to the improvement of the tracking resistance, it should be considered that this improvement is the central issue of the application. Hence, the objective problem is the provision of an outer cable sheath for a communication cable having improved tracking resistance and, at most, having simultaneously good properties such as mechanical properties, processability, etc.. The approach followed by the examining division, namely that the problem would be an improvement in a wide range of sheath characteristics other than the tracking resistance and that the improved tracking resistance can only be regarded as a bonus effect, is not in accordance with a systematic application of the problem-solution approach; in particular, in view of the disclosure of the invention, the improvement in the tracking resistance cannot be considered to constitute a mere accidental bonus effect.

Document D6 is concerned with the question of tracking resistance in polyethylene cable sheathing materials. According to the document (section 3.2.1 and Figure 8), the tracking resistance is improved with decreasing carbon black content. This phenomenon is especially strong below a carbon black content of 1 % by weight. Thus, the document constitutes evidence that, compared to the amount in document D1, the reduced amount of carbon black in the claimed optical cable contributes to a further improvement of the tracking resistance of the cable already achieved by the use of the bimodal polyethylene resin.

None of documents D2 to D4 suggests that the use of a multimodal polymer would improve the tracking resistance, let alone that a reduced carbon black content would result in a further improvement of the tracking resistance. In particular, documents D2 to D4 are silent as to the tracking resistance, and document D1 is uncritical as to the amount of carbon black and also silent as to any influence of the carbon black content on the tracking resistance.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

Except for minor amendments (replacement of the expression "characterized that" by "wherein" in the claims, and deletion of statements in the description

referring to the content of prior art disclosures as being "included herein by reference") that have no substantial effect on the content of the application (Article 123(2) EPC), the application documents amended according to the request of the appellant correspond to the application documents as originally filed.

3. *Claim 1 - Inventive step*

3.1 Document D1 discloses an optical cable having good tracking resistance and good mechanical properties (page 3, lines 2 to 8). The optical cable comprises at least one optical fibre and an outer sheath, the material of the sheath comprising a linear polyethylene, i.e. an olefin polymer, and 15 to 30 % by weight of magnesium or aluminium hydroxide (abstract). The document also specifies that the material of the sheath preferably also comprises carbon black in an amount of up to about 5 %, preferably 1 to 5 %, more preferably 2 to 3 %, such as 2.5 % by weight as a protection against ultraviolet light (abstract and page 5, lines 6 to 11).

The Board concurs with the examining division's view that the optical cable disclosed in document D1 represents the closest state of the art and that the subject-matter of claim 1 differs from this optical cable in the two following features:

i) the olefin polymer is a multimodal polymer obtained by coordination catalyzed polymerization, and

ii) the amount of carbon black in the sheath is between 0.01 and 0.9 % by weight.

None of these findings has been contested by the appellant during the appeal proceedings.

3.2 As regards the technical effects achieved by the distinguishing feature i) identified above and to be considered in the determination of the objective problem solved by the claimed invention according to the problem-solution approach, two different aspects have been considered during the proceedings:

- a first aspect relating to a wide range of sheath characteristics, and in particular to the mechanical properties (strength and shrinkage), to the processability and to the chemical stability of the sheath, and

- a second aspect relating to the tracking resistance of the sheath.

While the examining division focused the formulation of the objective problem on an improvement of the first aspect and concluded that this approach rendered obvious the distinguishing feature i) in view of the teachings of documents D2 to D4 and that the improvement in the second aspect would then be automatically achieved as a bonus effect, the appellant has submitted that the application is primarily directed to the improvement of the tracking resistance and that consequently the objective problem should rather focus on an improvement in the second of the aspects mentioned above.

The Board first notes that, as submitted by the appellant and supported by the disclosure of the application (page 1, line 18 to page 2, line 5, page 4, lines 9 to 15, page 5, first and second paragraphs, and page 16, second paragraph), the distinguishing feature i) improves the second aspect, i.e. improves

the tracking resistance of the sheath, and this improvement has not been contested by the examining division. Therefore, irrespective of whether or not this improvement might result as a bonus effect within the meaning of the established jurisprudence when the achievement of other technical effects is also considered (see "Case Law of the Boards of Appeal" EPO, 5th ed. 2006, chapter I, section D.9.7), the Board considers that the objective problem should also reflect the improved tracking resistance of the claimed optical cable.

In addition, although - as submitted by the appellant - there is no express indication in the application that the wide range of mechanical and chemical properties encompassed by the first aspect mentioned above would be improved over the disclosure of document D1,

- the application states explicitly that mechanical and chemical properties of the cable of the invention such as environmental stress crack resistance, tensile strength, elongation at break, low heat deformation, processability and low shrinkage are "good" and even "superior" (page 1, lines 1 to 4 and 13 to 17, page 2, lines 5 to 14, page 3, lines 11 to 13, page 4, lines 15 to 21, page 12, lines 5 to 17, and page 16, lines 3 to 6) and that this effect should be attained together with an improved tracking resistance (page 1, lines 3, 4 and 13 to 17, page 2, lines 3 to 10, and page 3, lines 11 to 13), even if the two requirements appear to be somewhat conflicting (page 4, last paragraph and page 10, third paragraph), and

- each of documents D2, D3 and D4 show that the replacement of an ethylene polymer by a multimodal ethylene polymer obtained by coordination catalyzed

polymerization improves generally the environmental stress cracking resistance, the thermo-oxidative stability, the processability, the tensile strength and the elongation at break and reduces the shrinkage at a given processability (document D2, abstract, page 1, last paragraph, page 2, first paragraph, page 4, lines 17 to 20, and page 9, second paragraph together with the examples and claim 6; document D3, abstract, column 1, line 51 to column 3, line 12 and column 4, lines 50 to 54 together with claim 6 and the examples; and document D4, abstract, column 1, line 48 to column 2, line 40, column 3, line 39 to column 5, line 6, and column 5, lines 38 to 41 together with the examples).

In view of these considerations, it has to be concluded on the basis of the technical information cited above that the use according to the claimed invention of multimodal ethylene polymers obtained by coordination catalyzed polymerization instead of ethylene polymers as in document D1 improves not only the tracking resistance, but also the aforementioned mechanical and chemical properties of the cable sheath. Accordingly, the appellant's formulation of the objective problem in terms of an improved tracking resistance while maintaining good mechanical properties is incomplete and cannot be followed by the Board. In addition, both the introductory part of the application (page 1, lines 1 to 4) and that of document D1 (page 1, lines 1 to 5) refer to both the tracking resistance and the mechanical properties as important technical characteristics of the cable, and the fact that the present application emphasizes that the primary improvement provided by the claimed invention is that

of a higher tracking resistance is, in the absence of any objective reason, insufficient to regard the aspect relating to the improvement in the tracking resistance as technically and objectively more significant than the aspect relating to the remaining properties considered above.

Accordingly, and since - irrespective of subjective considerations - what matters for a realistic and objective formulation of the problem solved by the claimed invention is what the skilled person objectively recognises as the problem when comparing the invention with the closest state of the art (see in this respect decision T 218/84, point 5.1 of the reasons), the formulation of the objective technical problem should not be confined in the present case to the improvement in one of the two aspects or - as submitted by the appellant - focused primarily on the improvement of a particular one of the two aspects, but reflect the simultaneous improvement in both aspects.

3.3 As regards the distinguishing feature ii) identified above, the examining division held that no correlation could be seen between the claimed reduced amount of carbon black and an increase in tracking resistance and concluded that the difference between the upper limit of the claimed range of the carbon black content (0.9 %) and the lower limit of the range disclosed in document D1 (1 %) was so small that it could not result in any technical effect which might form the basis of an inventive step. However, in reply to the view expressed by the Board in the annex to the summons that there was no evidence that the reduced amount of carbon black would contribute in combination with the remaining

claimed features to an improvement of the tracing resistance, the appellant filed as evidence the post-published document D6 and submitted that, contrary to the examining division's findings, the reduced amount of carbon black does contribute to such an improvement.

According to section 3.2.1 of document D6, it is common practice to add to polyethylene about 2 % by weight of carbon black as a protection against ultraviolet ageing but this quantity influences negatively the track resistance of the compound. In addition, according to Figure 8 of the document showing the dependency of the track resistance as a function of the carbon black content in a polyethylene resin measured in the dust fog test according to ASTM D 2132, the track resistance increases slowly when the carbon black content is decreased from 4 to 1 % and then increases significantly for values below 1 % by weight.

In view of this evidence, the Board is satisfied that, as submitted by the appellant, the distinguishing feature ii) requiring a carbon black content between 0.01 and 0.9 % by weight also contributes to improve the tracking resistance of the claimed optical cable over that disclosed in document D1.

3.4 In view of the considerations and conclusions in points 3.2 and 3.3 above, the objective technical problem solved by the claimed invention over the optical cable disclosed in document D1 can be seen in the simultaneous improvement of the tracking resistance and of the mechanical properties, the chemical stability and the processability of the material of the cable sheath.

3.5 The skilled person, confronted with the objective problem formulated above and including several aspects, would not confine its attention to the teachings in the prior art addressing simultaneously all of the aspects of the problem, but - following a realistic approach - would also consider prior art teachings addressing one or some of the aspects and would then consider the impact of the corresponding measures taught in the prior art on the remaining ones of the aspects. Accordingly, in view of the teaching of each of documents D2 to D4 relating to the improvement in a number of mechanical and chemical properties such as the environmental stress cracking resistance, the thermo-oxidative stability, the processability, the tensile strength, the elongation at break and the low shrinkage when an ethylene polymer is replaced by a multimodal ethylene polymer obtained by coordination catalyzed polymerization (see point 3.2 above, fourth paragraph), the skilled person would consider replacing the ethylene polymer of document D1 by a multimodal ethylene polymer obtained by coordination catalyzed polymerization in order to improve the properties mentioned above and to solve the aspect of the objective problem relating to the improvement in the mechanical properties, the processability and the chemical stability of the sheath. Following this approach, the skilled person would obtain an optical cable having a sheath of the polymeric compound defined in claim 1 and also having automatically a higher degree of tracking resistance than that of the optical cable of document D1 (point 3.2 above, third paragraph).

However, this approach would result in an optical cable with a sheath having the carbon black content specified in document D1, i.e. "up to about 5 % [...], suitably about 1-5 % [...] preferably 2-3 % by weight, such as 2.5 % by weight" (page 5, second paragraph), and not the claimed reduced carbon black content. In addition, the higher content of carbon black in the resulting optical cable would lead to a lower tracking resistance as that of the claimed cable (see point 3.3 above, second paragraph), i.e. the aforementioned approach would not result in an optical cable having the degree of improved tracking resistance achieved by the claimed cable. Therefore, the combination of document D1 with any of documents D2 to D4 would neither lead to the claimed cable nor provide a solution to the objective problem formulated above to the extent that the claimed invention does.

In addition, the sole document disclosing the adverse influence of the amount of UV-protection carbon black on the tracking resistance is document D6, which has been published after the filing date of the application in suit, and none of the prior art documents on file discloses or suggests the use of carbon black in an amount as defined in claim 1 and the corresponding technical effects.

3.6 In view of the above considerations and conclusions, the Board concludes that the available prior art does not render obvious the subject-matter of claim 1 within the meaning of Article 56 EPC 1973. The same conclusion applies to dependent claims 2 to 13 by virtue of their dependence on claim 1.

4. The Board is also satisfied that the amended application documents and the invention to which they relate meet the remaining requirements of the EPC within the meaning of Article 97(2) EPC.

In view of the above, the Board concludes that the decision under appeal is to be set aside and a patent be granted on the basis of the application documents amended according to the present request of the appellant (Article 97(2) EPC and Article 111(1) EPC 1973).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the following application documents:
   - claims 1 to 13,
   - description pages 1 to 21 and
   - drawing sheet 1/1,

   all filed during the oral proceedings held on 22 January 2009.

The Registrar: The Chairman:

M. Kiehl A. G. Klein