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D E C I S I O N
of 6 October 2004

Case Number: T 1092/04 - 3.4.2

Application Number: 00109027.3

Publication Number: 1052527

IPC: G02B 6/00

Language of the proceedings: EN

Title of invention:

Plastic Optical Fiber and Optical Fiber Cable

Applicant:

MITSUBISHI RAYON CO., LTD.

Opponent:

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Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

Keyword:

"Amended appeal claims not subject to objection of added subject-matter made by first instance"

Decisions cited:

-

Catchword:

-



Case Number: T 1092/04 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 6 October 2004

Appellant:

MITSUBISHI RAYON CO., LTD.
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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 19 March 2004
refusing European application No. 00109027.3
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: M. A. Rayner
M. J. Vogel

Summary of Facts and Submissions

- I. The applicant has appealed against the decision of the examining division refusing, for lack of compliance with Article 76(1) EPC (matter extending beyond the content of the earlier application), divisional European patent application number 00 109 027.3, which concerns optical fibre cable. In the decision under appeal, the examining division reasoned that the claims of the sole request presented to it defined performance characteristics of optical fibre cable which were disclosed in the earlier (=parent) application as originally filed in dependent claims. Thus, these performance characteristics were defined in combination with the technical features of claim 1 of the parent application, specifically the compositions of the polymeric materials forming core and the cladding. The original application documents of the parent application contained no disclosure of cables having core and cladding compositions other than those defined in that claim 1. Thus the claims presented to the division defined subject matter extending beyond the content of the parent application as originally filed, since they specified all cables having the defined performance characteristics, regardless of the composition of their cores and claddings.

The opening paragraph of the section of the description of the parent application entitled "Disclosure of the Invention" provided no basis for the claims as it merely defines the aim of the invention, not its nature. The nature of the invention is defined in the following paragraph, which corresponds to claim 1 of the parent application as originally filed. The last paragraph of

this section refers to "the aforesaid optical fibre", which can only refer to the fibre of the previous paragraph. The paragraph bridging pages 8 and 9 merely explains the previously unsatisfied requirement relating to numerical aperture and then indicates the cladding refractive index required to achieve that numerical aperture given the selected core material (as indicated in the first full paragraph of page 8). The following two paragraphs then indicate, in accordance with claim 1 of the parent application, which cladding materials are used to achieve this refractive index. The first full paragraph on page 8 states that the core material is selected from the viewpoint of mechanical strength.

- II. The appellant requests that the decision under appeal be set aside and that the application be remitted to the examining division for further prosecution. An auxiliary request is made for oral proceedings.

- III. In support of its position, the appellant submits that support is present in the parent application as originally filed for claim 1 as amended on page 6, third paragraph (core), page 8, second full paragraph (cladding), and page 8, third full paragraph (refractive index). Claim 1 filed with the appeal has been amended. Core diameter and transmission loss have been deleted consequent to the comments of the examining division. It is not necessary to limit the cladding material to the copolymer claimed in the earlier application because page 8 describes several copolymers which may be used as are now included in claim 1. Furthermore the first full paragraph on page 9 indicates that the long chain fluoroalkylmethacrylate

copolymer, to which claim 1 of the earlier application was limited, is an example. Similar amendments to claim 2 are supported in a similar way. Support is present for the remaining features of claim 2.

IV. The independent claims according to the main request of the appellant read as follows:-

"1. An optical fibre cable having a four-layer structure comprising a core of polymethylmethacrylate, a cladding which is formed of a material selected from fluorine containing methacrylate (co)polymers, fluorine-containing methacrylate-methacrylic ester copolymers, α -fluoromethacrylate (co)polymers and mixtures thereof and has a refractive index of 1.435 to 1.47, a protective layer and a jacket layer, which has a numerical aperture of 0.24 to 0.40 and which exhibits a transmission bandwidth of 80 to 340 MHz when measured at a fibre length of 100 m and under full-mode launch conditions, a transmission loss increment of not greater than 1dB upon bending under 20 mm R/180°C conditions, and a number of flexings to break of not less than 10,000 upon repeated flexing under 15 mm R/ \pm 90°C conditions.

2. An optical fibre cable having a four-layer structure comprising a core of polymethylmethacrylate, a cladding formed of a material selected from fluorine containing methacrylate (co)polymers, fluorine-containing methacrylate-methacrylic ester copolymers, α -fluoromethacrylate (co)polymers and mixtures thereof and has a refractive index of 1.435 to 1.47, a protective layer and a jacket layer wherein, when the exiting FFP (far field pattern) of light emitted after

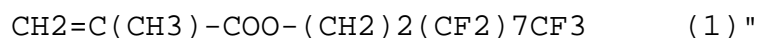
100 m propagation is measured under full-mode launch conditions, the ratio (R) of the value (Sp) obtained by integrating the FFP over an exit angle range of -20° to +20° to the value (S) obtained by integrating the FFP over the full angle range is not less than 98%."

Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.
2. As the present appeal is concerned with arguments about "added subject matter", it is necessary to look at the originally filed documents. Passages of the earlier application referred to in the proceedings, of which those given in sections 2.2-2.7 were also present in the divisional application, have the following content:-

2.1 Claim 1

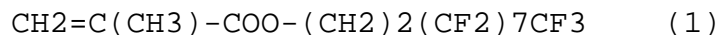
"A plastic optical fiber having a three-layer structure comprising a core, a cladding and a protective layer wherein the core material is polymethyl methacrylate and the cladding material is a copolymer composed of 20 to 45% by weight of long-chain fluoroalkyl methacrylate units represented by the following formula (1), 54 to 79% by weight of methyl methacrylate units, and 0.05 to 2% by weight of methacrylic acid units.



2.2 Disclosure of the Invention

"An object of the present invention is to provide an SI type POF and an SI type POF cable which have a combination of practical light transmission loss properties, wide bandwidth characteristics and high mechanical strength.

According to the present invention, there is provided a plastic optical fiber having a three-layer structure comprising a core, a cladding and a protective layer wherein the core material is polymethyl methacrylate and the cladding material is a copolymer composed of 20 to 45% by weight of long-chain fluoroalkyl methacrylate units represented by the following formula (1), 54 to 79% by weight of methyl methacrylate units, and 0.05 to 2% by weight of methacrylic acid units.



According to the present invention, there is also provided a plastic optical fiber cable having a four-layer structure comprising a core, a cladding, a protective layer and a jacket layer wherein the optical fiber cable is produced by covering the aforesaid optical fiber with a jacket layer."

2.3 Page 6, third paragraph

This is the content of the second paragraph of section 2.2 above.

2.4 First complete paragraph on page 8

"In the present invention, polymethyl methacrylate is used as the core material of the POF from the viewpoint of optical properties, mechanical strength, reliability and the like. Copolymers containing a minor amount of butyl methacrylate, ethyl methacrylate and/or maleimide compounds which are copolymerizable with methyl methacrylate may also be used."

2.5 Page 8, second full paragraph

"Examples of the cladding material used for the POF of the present invention include fluorine-containing methacrylate (co)polymers, fluorine-containing methacrylate-methacrylic ester (co)polymers, α - fluoromethacrylate (co)polymers and mixtures thereof."

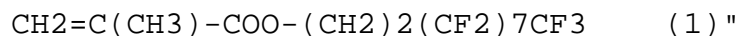
2.6 Paragraph bridging pages 8 and 9 (=Page 8, third full paragraph)

"In order to impart a numerical aperture of 0.24 to 0.40 to the POF, the cladding material should have a refractive index of 1.435 to 1.47. If the numerical aperture of the fiber is too small, an increase in light transmission loss will be caused when the fiber is bent, and an increase in coupling loss will also be caused. Accordingly, the numerical aperture must be not less than 0.24 and preferably not less than 0.27. In order to secure a bandwidth of 80 MHz at a fiber length of 100 m, the numerical aperture must be not greater than 0.40. In order to secure a bandwidth of 90 MHz or greater, a numerical aperture of not greater than 0.34 is preferred. Consequently, the cladding material

should preferably have a refractive index of 1.45 to 1.465."

2.7 Page 9, first full paragraph

"Accordingly, a cladding material having a composition comprising a combination of monomers which provide a refractive index in the range of 1.435 to 1.47 is chosen. One example thereof is a copolymer composed of a long-chain fluoroalkyl methacrylate of formula (1), methyl methacrylate and methacrylic acid. This copolymer has a well-balanced combinations of properties such as mechanical properties, transparency and resistance to thermal decomposition.



3. *Article 76(1) EPC*

3.1 As the independent claim of the parent application specified materials for a plastic optical fibre, the focus of the "added subject matter" problem seen by the examining division in the light of the (then different) claims before it was on cables of unspecified material defined by performance characteristics. Since the core material now recited in the independent claims of the divisional application is the same as that recited in independent claim 1 of the parent application, the objection of the examining division in relation to the core is no longer really relevant. There is thus, in the view of the board, no reason to consider this added subject matter. So far as the cladding is concerned, the passage mentioned in section 2.5 above supports the material now recited in the independent claims and this passage even includes a specific recitation of

"Examples of the cladding material used for the POF of the present invention". Thus, while it is true that the present version of the independent claims is not limited to the compositions of the polymeric materials forming the cladding as claimed in claim 1 of the parent application and thus the objection of the examining division is more pertinent, the view of the board is that it would not really be fair in the context of "added subject matter" to require the claims of the divisional application to be so limited, as it is not true to say that the materials now claimed for the cladding are not disclosed. This is all the more so because the material recited in claim 1 of the parent example can, according to the passage mentioned in point 2.7, even be considered just as an example. The refractive range specified in the independent claims also finds its support in the passage quoted in section 2.7 above.

- 3.2 The features of the independent claims before the examining division relating to performance characteristics of the claimed optical fibre cable did not give rise to the refusal of the examining division, which established that they were disclosed in originally filed claims 8 and 9. The board leaves open, in the context of the present appeal, the question of omission in the present claims of features relating to core diameter and transmission loss, as this question is not directly related to the reasons for refusal. The board also leaves open any question relating to erroneous introduction of "°C" into claim 1 in place of "°".

3.3 The board thus reached the conclusion that the "added subject matter" reasoning for refusal as advanced by the examining division is not persuasive for the present claims.

4. *Further prosecution*

4.1 The foregoing remarks of the board relate to added subject matter as specifically related to the reason for refusal given by the examining division. The present claims were not even presented by the appellant before issue of the decision under appeal, so the examining division was not in a position to make a complete examination before issue of that decision. In this situation and in view of the substantial modifications made to the claims, other subject matter, including the matters left open in section 3.2 above, or other considerations, in particular also in relation to other Articles and Rules in the EPC in the context of the examination have not been addressed by the board.

4.2 In order to ensure the possibility of examination by two instances, the board hesitated to make more than this rather limited examination in the context of the present appeal, and thus, as requested by the appellant, remittal of the case in accordance with Article 111 EPC to the examining division for further prosecution is appropriate. As this course of action is in accordance with the request of the appellant, oral proceedings before the board according to its auxiliary request are not necessary.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The application is remitted to the examining division for further prosecution.

The Registrar:

The Chairman:

P. Martorana

A. G. Klein