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**Datasheet for the decision
of 20 September 2016**

Case Number: T 1084/13 - 3.4.02

Application Number: 04803113.2

Publication Number: 1812816

IPC: G02B6/44

Language of the proceedings: EN

Title of invention:

WATER-BLOCKED OPTICAL CABLE AND PROCESS FOR THE PRODUCTION
THEREOF

Applicant:

Prysmian S.p.A.

Headword:

Relevant legal provisions:

EPC 1973 Art. 56

Keyword:

Inventive step - (yes) - after amendment

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T 1084/13 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 20 September 2016

Appellant: Prysman S.p.A.
(Applicant) Viale Sarca 222
20126 Milano (IT)

Representative: Bottero, Claudio
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 28 November
2012 refusing European patent application No.
04803113.2 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman R. Bekkering
Members: A. Hornung
B. Müller

Summary of Facts and Submissions

- I. The applicant appealed against the decision of the examining division refusing European patent application No. 04803113.2 on the basis of Article 56 EPC 1973.
- II. With the statement setting out the grounds of appeal the applicant requested that the appealed decision be set aside and a patent be granted on the basis of the claims according to the main request or one of the first to fifth auxiliary requests, all requests filed with the statement of grounds.
- III. In a communication accompanying a summons to oral proceedings, the board expressed its preliminary opinion that the subject-matter of all requests on file seemed to lack an inventive step.
- IV. In response to the summons to oral proceedings, the applicant withdrew all requests then on file and filed a new main request, based on the previous fourth auxiliary request.
- V. During a telephone conversation, the board informed the applicant that the new main request seemed to infringe the requirements of Article 123(2) EPC and Article 84 EPC 1973.
- VI. The applicant filed a new main request on 12 September 2016 with a view to remedying the outstanding deficiencies. Thereupon, the oral proceedings were cancelled.
- VII. The present decision refers to the following documents:

D1: US 2003/0026559
D3: JP 62222214
D4: US 5,157,752

VIII. Independent claim 1 according to the main request reads as follows:

A method of controlling water propagation in an optical cable (100) for communication comprising:

- a retaining element (2);
- at least two individual optical fibers (3) housed within said retaining element (2); and
- a water swellable yarn (4) housed within said retaining element (2), and arranged together and in contact with said at least two individual optical fibers (3);

wherein the method comprises selecting the minimum volume of the water swellable yarn (4) according to the following equation:

$$V_W / V_{TF} = k / V_t + R \quad (1)$$

in which V_w is the minimum volume of the water swellable yarn (4) after swelling upon contact with water;

V_{TF} is the total free volume in the retaining element (2);

k is a constant = 180 mm³ /m;

R is a constant = 1.4; and

V_t is the free volume per each individual optical fiber (3).

Reasons for the Decision

1. Amendments

The board is satisfied that the present amended set of claims 1-9 fulfills the requirement of Article 123(2) EPC.

In particular, present method claim 1 is generally based on original device claim 1. The method step of claim 1 of selecting the minimum volume of the water swellable yarn according to equation (1), wherein $k = 180 \text{ mm}^3/\text{m}$ and $R = 1.4$ can be directly and unambiguously derived from original claim 1 stating *inter alia* that "the water swellable yarn is selected according to the equation ... " and from the ranges for the constants k and R in original claim 1 defining lower limits of $180 \text{ mm}^3/\text{m}$ and 1.4, respectively.

2. Inventive step

2.1 During the first-instance proceedings, the examining division considered that D4 represented the closest prior art. The board agrees with this finding.

2.2 The claimed subject-matter differs from the method of controlling water propagation of D4 in that it comprises the step of selecting the minimum volume of the water swellable yarn according to equation (1), wherein $k = 180 \text{ mm}^3/\text{m}$ and $R = 1.4$.

2.3 This step of selecting a minimum volume of the water swellable yarn on the basis of equation (1) solves the problem of avoiding water propagation within an optical cable while using a minimum of water swellable yarn.

2.4 Prior art documents

2.4.1 D4, with reference to figures 2 and 3 and the corresponding description in column 3, line 58 to column 4, line 27, discloses a method for controlling water propagation in an optical cable by intermingling an elongate element which swells upon contact with water to block the passageway between the optical fibres. In case the passageway is so large that the elongate element is not sufficient to block

water propagation, D4 merely provides rough guidance: "undoubtedly if the diameter of the passageway should be greater than two or more of the elongate elements should be included with the fibers as required". The invention in D4 is concerned with blocking water propagation but not with optimizing the exact amount of water swellable material necessary therefor. If the skilled person, starting from D4, nevertheless envisaged reducing the amount of swellable material to a minimum, then he would receive no hint in D4 to take account of the free volume per optical fiber V_t since none of the parameters required for calculating the V_t is disclosed in D4, in particular, D4 does not disclose the exact number of fibers enclosed in the optical cable.

2.4.2 D1 discloses an optical cable comprising a plurality of stacked fiber optic ribbons, which is fundamentally different to the optical cable of claim 1 comprising individual optical fibers with space in between for the water swellable yarn. D1, with reference to claim 1 of D1, teaches that the water swellable yarn should have a certain swell capacity M_{capacity} above a certain minimum M_{critical} . However, this minimum M_{critical} is defined essentially in terms of the open area of the buffer tube A_{tubeopen} , which corresponds to the total free volume in the retaining element V_{TF} of present claim 1. There is no hint in D1 about the role played by the number of optical fibers in the determination of the minimum M_{critical} . Hence, D1 is unsuitable to guide the skilled person towards equation (1) defined in claim 1.

2.4.3 D3 discloses a further method for controlling water propagation which is similar to that of D1. Indeed, D3 also teaches a minimum value (300%) for the space occupied by the water absorbing material in terms of the total gap in the optical cable, i.e. in terms of a parameter corresponding to

the total free volume in the retaining element V_{TF} of present claim 1. Therefore, D3 is not more relevant than D1 for guiding the skilled person to the claimed invention.

2.5 The method of claim 1 solves the problem mentioned above by using equation (1), which requires to take due account of the free volume per optical fiber V_t . The free volume per optical fiber V_t equals the total free volume V_{TF} divided by the number of individual optical fibres. More precisely, equation (1) provides that the minimum volume of water swellable yarn V_W decreases when the free volume per optical fiber V_t increases, which is considered to be surprising. Anyway, this kind of relationship is not disclosed and not rendered obvious by the available prior art which merely considers the total free volume in the optical cable, irrespective of the number of optical fibers in the optical cable.

2.6 It follows that neither the problem, nor the claimed solution is described in the available prior art documents or otherwise rendered obvious.

2.7 In view of the above considerations, the board comes to the conclusion that the claimed method of controlling water propagation according to claim 1 involves an inventive step over the available prior art.

Claims 2 to 9 are dependent on claim 1, providing further limitations. The subject-matter of these claims, therefore, also involves an inventive step.

3. For the above reasons the board is satisfied that the application documents as amended according to the present main request and the invention to which they relate meet the requirements of the EPC and that a patent can be granted on the basis thereof.

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 documents:
 - Claims 1 to 9 of the main request as filed with the letter of 12 September 2016,
 - Description pages 1 to 18 as filed with the letter of 12 September 2016,
 - Drawing sheets 1/3 to 3/3 as filed with the letter of 12 September 2016,.

The Registrar:

The Chairman:



M. Kiehl

R. Bekkering

Decision electronically authenticated