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D E C I S I O N
of 25 May 2005

Case Number: T 0728/02 - 3.2.7

Application Number: 97400054.9

Publication Number: 0785173

IPC: C03B 37/03

Language of the proceedings: EN

Title of invention:
Reducing deformation of a coating on a coated optical fiber during the fiber drawing process

Applicant:
Draka Comteq B.V.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0728/02 - 3.2.7

D E C I S I O N
of the Technical Board of Appeal 3.2.7
of 25 May 2005

Appellant: Draka Comteq B.V.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 3 April 2002 refusing European application No. 97400054.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: H. Meinders
Members: K. Poalas
E. Lachacinski

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the Examining Division refusing the European patent application No. 97 400 054.9.

II. The Examining Division held that the subject matter of claim 1 as filed on 2 July 2001 did not involve an inventive step in the light of documents

D1: JP 07 025 540 A, and

D1´: Japanese Patent Office computer translation into English of D1.

III. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Claims: 1 (first part) as filed on 9 March 2005 and 1 (second part) to 14 as filed on 2 July 2001;

Description: pages 1,2,4,6 to 14 as originally filed, page 3 as filed on 2 July 2001 and page 5 as filed on 9 March 2005;

Drawings: sheet 1/2 to 2/2 as originally filed.

With the letter dated 26 June 2002 the appellant requested as an auxiliary measure oral proceedings.

IV. Claim 1 reads as follows:

" An apparatus for drawing a coated optical fiber (35) from a drawing tower, the coated optical fiber (35) including a central fiber surrounded by at least one layer of protective coating material (15,20), the apparatus including a rotating draw capstan (75) having a cylindrical drawing surface, wherein a capstan belt (80) is mounted on one or more capstan belt pulleys (82,83) with a surface (92) of said capstan belt (80) in engagement with said surface of said draw capstan (75), said capstan belt (80) being driven for rotation on said one or more capstan belt pulleys (82,83) by rotational movement of said draw capstan (75), wherein the coated optical fiber (35) is drawn between said draw capstan (75) and said capstan belt surface (92), and characterized in that:
at least said surface (92) of said capstan belt (80) is manufactured of a belt material having a lower modulus of elasticity than the coating material (15,20) on the coated optical fiber (35) when the coating material (15,20) contacts said capstan belt surface (92), such that during contact of said capstan belt surface (92) with the coating material (15,20), said capstan belt surface (92) will deform rather than the coating material (15,20), the modulus of elasticity of said belt material (92) being in the range of 10 to 200 PSI (0.07 to 1.38 MPa) at 10% strain and in the range of 200 to 5000 PSI (1.38 to 34.5 MPa) at 100% strain."

V. In the decision under appeal the Examining Division argued essentially as follows:

It is obvious to a person skilled in the art that the coating of the drawn fiber is deformed due to the materials of the capstan wheel and the capstan belt,

there simply being no other parts of the drawing tower which could cause such deformation. It is also obvious to the skilled person that only the fact that the capstan belt/capstan have a higher modulus of elasticity than the coating, at the moment of contact between them, could cause such deformation and that therefore the deformation could be avoided by choosing a material for at least the (surface of the) capstan belt that has, at the moment of contact with the coated fiber, a modulus of elasticity lower than that of the coating of the fiber.

It is also obvious to the skilled person to make tests to determine the moduli of elasticity of the material suitable for the (surface of the) capstan belt, thus arriving at the moduli of elasticity defined in claim 1, especially bearing in mind that conventional materials used for the capstan belt, such as reinforced hard rubber and tough woven fabric, have a lower modulus of elasticity than the cured coating of the fiber.

Therefore, the apparatus defined in claim 1 does not meet the requirements of Articles 52(1) and 56 EPC.

VI. In essence, the Appellant's arguments in support of the request are as follows:

Document D1 discloses an apparatus according to the preamble of claim 1 of the present application.

The problem solved by the apparatus disclosed in document D1 is to absorb or prevent micro-vibrations from being transmitted to the optical fiber. The

apparatus disclosed in document D1 includes absorbing means acting as a bearing having no vibration generating source of a receiving capstan and guide rollers.

The problem to be solved in the present application is to avoid deformation of the fiber coating when the fiber is pressed against the capstan wheel.

Nothing in the art would lead the skilled person to modify the apparatus disclosed in document D1 such that it has the features according to claim 1, in order to solve the above mentioned problem.

Therefore, the subject-matter of claim 1 involves an inventive step.

Reasons for the Decision

1. *Amendments (Article 123(2) EPC)*

Amended claim 1 differs from claim 1 as originally filed in that the expression "the coating material being at an elevated temperature greater than ambient temperature" is deleted, the expression "when the coating material (15,20) is at said elevated temperature" is amended into "when the coating material (15,20) contacts said capstan belt surface (92)" and the ranges of the modulus of elasticity of the belt material at 10% and 100% strain are introduced into claim 1.

The basis for the above mentioned amendments can be found in the first paragraph of the originally filed page 5, said paragraph being directed to the capstan belt of the invention, without any reference to the temperature of the coating material on the optical fibre with which it is in contact, and in the originally filed claims 3 and 4.

Claim 2 is identical with claim 2 as originally filed and claims 3 to 14 are essentially identical to originally filed claims 5 to 16.

The description pages 3 and 5 have been amended in order to indicate document D1 and to adapt the description to amended claim 1.

Therefore, the application as amended does not give rise to objections under Article 123(2) EPC.

2. *Novelty*

None of the documents on file discloses an apparatus for drawing a coated optical fiber from a drawing tower, said apparatus having a capstan belt surface material with a modulus of elasticity within the ranges defined in claim 1 of the present application.

Therefore, the subject-matter of claim 1 is novel in the sense of Article 54(1) EPC.

Novelty of the subject-matter of claim 1 was acknowledged by the Examining Division in the decision under appeal.

3. *Inventive step of the subject-matter of claim 1 as amended*

3.1 Closest prior art

Document D1 (the Board has used for this decision D1´, the computer translation of the Japanese application JP-07 025 540 A made by the Japanese Patent Office) represents the closest prior art as it describes an apparatus for drawing a coated optical fiber 32 from a drawing tower, the coated optical fiber including a central fiber surrounded by at least one layer of protective coating material applied through the coating covering equipment 33, the apparatus including a rotating draw capstan 39 having a cylindrical drawing surface, wherein a capstan belt 43 is mounted on one or more capstan belt pulleys 41, 42 with a surface of said capstan belt 43 in engagement with said surface of said draw capstan 39, said capstan belt 43 being driven for rotation on said one or more capstan belt pulleys 41, 42 by rotational movement of said draw capstan 39, wherein the coated optical fiber 32 is drawn between said draw capstan 11 and said capstan belt surface (see figures 14, 15).

This corresponds to the apparatus as defined in the preamble of claim 1.

3.2 Problem underlying the invention

The drawing apparatus as known from document D1 has the disadvantage of the deformation of the coating on the optical fiber due to the materials used for the capstan belt, resulting in an attenuation of the optical fiber,

see page 4, lines 17 to 20 of the description of the application.

3.3 Solution

This problem is solved, in accordance with the characterizing portion of claim 1, by modifying the apparatus known from document D1 such that at least the surface of the capstan belt is manufactured of a belt material having a lower modulus of elasticity than the coating material on the coated optical fiber when the coating material contacts the capstan belt surface. During contact of the capstan belt surface with the coating material the capstan belt surface will deform rather than the coating material. Further, the modulus of elasticity of said belt material is in the range of 10 to 200 PSI (0.07 to 1.38 MPa) at 10% strain and in the range of 200 to 5000 PSI (1.38 to 34.5 MPa) at 100% strain.

This prevents an inhomogeneous stress distribution on the optical fiber. Microbending-induced added loss as a result of an inhomogeneous stress distribution on the optical fiber can thereby be reduced or eliminated.

3.4 This solution is not rendered obvious by the prior art available in the file, for the following reasons:

Document D1 is directed to the problem of securing a desired outer-diameter precision by the optical fiber (see paragraphs [0005] and [0006] of D1´) by either absorbing or preventing micro-vibration from being transmitted to the optical fiber, by shifting the fiber transversally over the capstan belt and/or by cleaning

the capstan belt. It proposes, among others, vibrational-energy absorption means in the form of the bearings 16, 23, 24 (see paragraph [0016] of D1´).

It does not address the problem of the deformation of the fiber coating when the fiber is pressed between the capstan wheel and the capstan belt as defined above, nor does it teach the use of a capstan belt having a surface material which has a lower modulus of elasticity than the coating material on the coated optical fiber when the coating material contacts said capstan belt surface, said modulus of elasticity of the surface material lying within the ranges mentioned in claim 1.

Document D1 neither addressing the above mentioned problem of the present application nor teaching the use of the claimed surface material of the capstan belt therefore does not provide the skilled person with the indications to provide the claimed material of the capstan belt.

Also the other documents available on file do not provide such indications.

3.5 The Board cannot follow the argument put forward by the Examining Division in point 3.3 of the Reasons of the decision under appeal according to which "It will be obvious to a skilled person in the art that, when he notices that the coating of the drawn fiber is deformed, this is due to the materials of the capstan wheel and the capstan belt, there simply being no other parts of the drawing tower which could cause such deformation".

The drawing force applied to the drawn fiber, the velocity with which the fiber is drawn, the number of pulleys used, the roughness and the form of the contact surfaces of the pulleys, the capstan wheel and the capstan belt used are all factors which have an influence on the contact- and drawing forces acting upon the coating of the drawn fiber during the fibre drawing process. Therefore, the selection of a surface material for the capstan belt is one of a large number of possible solutions to this problem. Thus there is no question of a "one-way street" situation for the skilled person seeking to reduce the deformation of the applied coating of a drawn fiber, as was argued by the Examining Division (see point 3.3 of the reasons, second sentence).

3.6 The argument of the Examining Division, that it was obvious to the skilled person that the deformation of the coating of the drawn fiber "could be avoided by choosing a material for at least the (surface of the) capstan belt that has, at the moment of contact with the coated fiber, a modulus of elasticity lower than that of the coating of the fiber" (see last sentence of point 3.3 of the Reasons for the Decision of the Examining Division) derives from an ex post facto determination of the knowledge of the skilled person, taking account of the teaching of the present application.

3.7 Also the argument under point 3.4 of the Reasons for the Decision of the Examining Division according to which it was obvious to the skilled person to make tests in order to define the ranges for the modulus of elasticity given in claim 1 of the present application,

thereby arriving at the claimed ranges of modulus of elasticity without exercising any inventive activity, cannot be followed by the Board, for the following reasons:

Since the skilled person is not provided by the prior art with an indication to **modify** the known capstan belt so that its surface material has a lower modulus of elasticity than the coating material on the coated optical fiber when the coating material contacts the capstan belt surface, there is no reason for him to carry out any tests in that respect.

3.8 The statement under point 3.6 of the Reasons for the Decision of the Examining Division that conventional materials used for the capstan belt, such as reinforced hard rubber and tough woven fabric, have a lower modulus of elasticity than the cured coating of the fiber, has to be considered as an unsubstantiated allegation put forward by the Examining Division without giving any evidence to support it.

3.9 For the above-mentioned reasons, the subject-matter of claim 1 of the present application involves an inventive step within the meaning of Article 56 EPC.

4. Claims 2 to 14, dependent on claim 1, describe further embodiments of the apparatus of claim 1. Therefore, the subject-matter of claims 2 to 14 also involves an inventive step.

5. In the light of the above findings, there is no need for the appellant to be heard in oral proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent with the following documents:

Claims: 1 (first part) as filed on 9 March 2005 and 1 (second part) to 14 as filed on 2 July 2001;

Description: pages 1, 2, 4, 6 to 14 as originally filed,
page 3 as filed on 2 July 2001 and
page 5 as filed on 9 March 2005;

Drawings: sheet 1/2 to 2/2 as originally filed.

The Registrar: The Chairman:

G. Nachtigall H. Meinders