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Datasheet for the decision of 11 February 2009

Case Number: T 1120/06 - 3.4.02

Application Number: 98850099.7

Publication Number: 0890853

IPC: G02B 6/255

Language of the proceedings: EN

Title of invention:
Splicing different optical fiber types

Applicant:
TELEFONAKTIEBOLAGET LM ERICSSON (publ)

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Claims 1, 2 - inventive step (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1120/06 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 11 February 2009

Appellant: TELEFONAKTIEBOLAGET LM ERICSSON (publ)
SE-164 83 Stockholm (SE)

Representative: Holmberg, Martin Tor
Bergenstrahle & Lindvall AB
P.O. Box 17704
SE-118 93 (SE)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 24 February 2006 refusing European application No. 98850099.7 pursuant to Article 97(1) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The applicant lodged an appeal against the decision of the examining division refusing European patent application number 98 850 099.7. The patent application is concerned with splicing different optical fibre types.

II. In the decision under appeal, the examining division made reference to the following document:

D1 Wenxin Zheng: "Low-Loss Splicing Technique for Erbium-Doped Optical Fibre Amplifiers" Ericsson Review, vol.70, no.2, 1993, pages 71 to 80.

In the appeal proceedings, reference has also been made to the following document referred to in line 28 on page 3 of the description of the patent application:

D2 W. Zheng, O. Hultén and R. Rylander, "Erbium-doped fiber splicing and splice loss estimation." IEEE J. of Lightwave Technology., Vol. 12, No. 3, pp. 430 - 435, 1994.

III. According to the examining division, independent method claim 1 presented to it was directed to subject matter which is not novel in the sense of Article 54 EPC having regard to document D1. In particular, the division considered document D1 to disclose the following, the remarks in parentheses referring to this document:-

A method of splicing the ends of two optical fibres of different types to each other, comprising the steps of (see page 73, col. 2, paragraph 2 - page 80, col. 1, paragraph 1):

- providing two pieces of optical fibres identical to each of the two first optical fibres to be spliced (i.e. the first and second pieces are identical to a DSF fibre with Ge doped silica core and an Erbium doped amplifier fibre as implicitly disclosed by the following step)
- positioning end surfaces of the fibre ends of the two pieces at each other (see e.g. figures 7, 8, and 11, a DSF fibre with Ge doped silica core, and an Erbium doped amplifier fibre)
- applying heat to a region at the fibre ends to heat them to such a temperature that dopant material of the fibre ends diffuse (see figure 8, and figure 11, page 73, col. 2, paragraph 2 - page 74, col. 2, paragraph 1)
- determining during the heating hot-fibre (refractive) indices of each fibre end at periodically repeated times having small intervals there between (see figure 8 and figure 11, page 73, col. 2, paragraph 2 - page 74, col. 2, paragraph 1)
- determining also during the heating the loss of optical power of light propagating from one piece to the other one at periodically repeated times having small intervals there between (see page 74, col. l, paragraph 2 - page 75, col. 1, paragraph 1, and Figure 8)
- monitoring determined values of the loss of optical power in order to find a minimum value of the loss (see page 74, col. l, paragraph 2 - page 75, col. 1, paragraph 1, and figure 8)

- and recording the determined hot-fibre (refractive) indices determined at the time when the minimum value was determined or recording a threshold value from the determined hot-fibre (refractive) indices at the time when the minimum value was determined (see page 77, col. 2, paragraph 1 - page 78, col. 1, paragraph 1, and figure 10, page 78, col. 2 paragraph 2, col. 3, and page 80, col. 1, paragraph 1)
- positioning end surfaces of the ends of the first optical fibres at each other (see references cited above)
- applying heat to a region at the ends of the first optical fibres to heat them to such a temperature that dopant material of the ends diffuse (see the references cited above)
- determining during the application of heat hot-fibre (refractive) indices of each end of the first optical fibres at periodically repeated times having small intervals there between (see references cited above)
- comparing also during the application of heat one of the determined hot-fibre (refractive) indices to a threshold value calculated from the recorded hot-fibre indices or comparing a quantity derived from one of the determined hot-fibre indices to the recorded threshold value (i.e. one of the fibre indices is determined and from this value the other fibre index value is subtracted from which subtracted value the splice loss or the fibre index mismatch corresponding to a particular splice loss is calculated, see references cited above and below; thus either a quantity derived from the hot- fibre index - the calculated splice loss - or a quantity calculated from the recorded fibre index - the fibre index mismatch directly- is used), and

- stopping the application of heat when the threshold value is achieved (see figure 11, the last two steps, and page 78, col. 2, paragraph 3).

IV. As an additional comment, the division observed that it considered the subject matter of device claim 2 also not novel for corresponding reasons.

V. The appellant requested that the decision under appeal be set aside and the patent application be further processed. The appellant argued with respect to novelty that hot fibre indices as referred to in the independent claims are different to core size and refractive index as disclosed in document D1. Therefore the subject matter concerned is novel. With respect to inventive step, the appellant argued that the application concerns performing measurement on a test pair of fibres to obtain information and a threshold value before using these on an actual fibre pair, as opposed to real time operation as disclosed in document D1 using other parameters. Thus, the subject matter claimed involves an inventive step because it is a simpler measurement operation which can be executed more rapidly and easily than the prior art.

VI. The board reviewed the case which led to it having doubts about the position of the appellant on substantive patentability. The board therefore offered the appellant an opportunity for oral presentation of its case by issuing a summons to oral proceedings. In a communication attached to the summons, the board expressed its opinion, including the following:

The board did not accept that the prior art did not use hot fibre indices. The board saw this as explicit in, for example, the last paragraph of the right hand column on page 73 of document D1 or the left hand column on page 432 of document D2. Likewise a threshold is used (see, for example, the paragraph bridging the right column on page 433 with the left column on page 434 of document D2). The board could accept that the prior art disclosures are real time, rather than actual splicing being effected using the threshold previously determined. Nevertheless, the subject matter claimed amounted to no more than obvious automation, as more or less foreseen in the passages referred to in the prior art. Moreover, the board did not identify anything special in the description pertaining to the rather general definition of the threshold, the processing steps or the algorithm used, which might lead to subject matter involving an inventive step.

VII. The appellant did not respond to the opinion of the board, nor was the appellant represented at the oral proceedings.

VIII. The independent claims of the application are worded as follows:-

"1. A method of splicing the ends of two first optical fibers of different types to each other, characterized by the steps of
- providing two pieces of optical fibers identical to each of the two first optical fibers to be spliced,
- positioning end surfaces of fiber ends of the two pieces at each other,

- applying heat to a region at the fiber ends to heat them to such a temperature that dopant material of the fiber ends diffuse,
- determining during the heating hot-fiber indices of each fiber end at periodically repeated times having small intervals therebetween,
- determining also during the heating the loss of optical power of light propagating from one piece to the other one at periodically repeated times having small intervals therebetween,
- monitoring determined values of the loss of optical power in order to find a minimum value of the loss,
- recording the determined hot-fiber indices determined at the time when the minimum value was determined or recording a threshold value calculated from the determined hot-fiber indices determined at the time when the minimum value was determined,
- positioning end surfaces of the ends of the first optical fibers at each other,
- applying heat to a region at the ends of the first optical fibers to heat them to such a temperature that dopant material of the ends diffuse,
- determining during the application of heat hot-fiber indices of each end of the first optical fibers at periodically repeated times having small intervals therebetween,
- comparing also during the application of heat one of the determined hot-fiber indices to a threshold value calculated from the recorded hot-fiber indices or comparing a quantity derived from one of the determined hot-fiber indices to the recorded threshold value or, and
- stopping the application of heat when the threshold value is achieved.

2. A device for splicing the ends of two first optical fibers of different types to each other,
characterized by
- positioning means for positioning end surfaces of fiber ends of two optical fibers at each other,
- heating means for applying heat to a region at the fiber ends to heat them to such a temperature that dopant material of the fiber ends diffuse,
- determining means for determining during the applying of heat hot-fiber indices of each of the fiber ends at periodically repeated times having small intervals therebetween,
- light injecting means for injecting light in an optical fiber having an end surface of a fiber end
- light detecting means
- - for receiving light from another optical fiber having an end surface of a fiber end positioned by the positioning means for detecting, also during the applying of heat, the light propagating from the light injecting means through an optical fiber having an end surface of a fiber end positioned by the positioning means to the fiber end of said another optical fiber and through said another optical fiber, and
- - for determining from the received light the loss of optical power of light propagating from the first optical fiber to the second optical fiber having end surfaces of fiber ends positioned by the positioning means at periodically repeated times having small intervals therebetween,
- control means coupled to the heating means, the determining means and the light detecting means for monitoring determined values of the loss of optical power in order to find a minimum value of the loss,

- the control means comprising memory means for recording the determined hot-fiber indices determined at the time when a minimum value of the loss was determined, or the control means comprising calculation means for calculating a threshold value based on the determined hot-fiber indices determined at the time when a minimum value of the loss was determined and memory means for storing the threshold value,
- the control means comprising comparing means for comparing, during the applying of heat, one of the determined hot-fiber indices to a threshold value calculated from the recorded hot-fiber indices or for comparing, during the applying of heat, a quantity derived from one of the determined hot-fiber indices to the stored threshold value or, and
- the control means being arranged control the heating means to stop applying heat when the comparing means finds that the threshold value is achieved."

IX. The board gave its decision at the end of the oral proceedings, which were held in the absence of the appellant.

Reasons for the Decision

1. The appeal is admissible.

2. The board is not persuaded by the submissions of the appellant that the prior art did not use hot fibre indices. Reference to the passages of document D1 referred to by the examining division, in particular the last paragraph on page 73 to the first paragraph on page 75 reveals that the document refers to a heated

fibre-index profile obtained from the digital image of a heated fibre as can also be seen with reference to Figure 7. The board considers its view confirmed by the comparable figure shown as Figure 6 in document D1, the document specifically referred to in the application as teaching a hot fibre monitoring technique. The board has thus not been offered any reason to depart from its opinion as expressed in the summons to oral proceedings that a hot fibre index is disclosed in document D1, nor has it itself seen any reason to change its position. The board therefore considers the examining division to be correct in it assessment of lack of novelty of the subject matter concerned.

3. Novelty of the subject matter of claim 1 is however given by the penultimate feature thereof, i.e. pertaining to the threshold calculated from recorded hot fibre indices or a quantity derived therefrom. As the appellants argued and the board can accept, the problem solved by the novel subject matter is thus providing a simpler measurement which can be carried out more rapidly and easily. However, both of documents D1 and D2, in the passages referred to by the examining division and the board, refer to the fusion process continuing until a given threshold meeting the general wording of the claim is reached (see document D1, page 77, penultimate paragraph or document D2, page 434, first paragraph), and whether this threshold is reached during the current process or derived from a previous procedure is immaterial in effecting the method foreshadowed in these documents. The board accepts that use of a recorded value is quicker and simpler, but solving this problem amounts to no more than obvious automation. There is nothing else entailed in the

general definition of the threshold or the calculating of comparing steps, which could contribute to subject matter involving an inventive step. Accordingly, the subject matter of claim 1 cannot be considered to involve an inventive step. A corresponding conclusion applies to the subject matter of claim 2, which concerns a device for splicing with corresponding features for carrying out the method.

4. The appeal therefore failed to convince the board that the patent application meets the requirements of the Convention for grant of a patent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar The Chairman

M. Kiehl A. G. Klein