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Datasheet for the decision of 21 November 2006

Case Number: T 0752/04 - 3.4.02

Application Number: 01402511.8

Publication Number: 1195628

IPC: G02B 6/22

Language of the proceedings: EN

Title of invention:
Optical fibre with improved hydrogen resistance

Applicant:
FUJIKURA LTD.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Claim 1 - inventive step (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0752/04 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 21 November 2006

Appellant: FUJIKURA LTD.
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Tokyo (JP)

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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 29 January 2004 refusing European application No. 01402511.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The present appeal was lodged by the applicant against the decision of the examining division refusing European patent application number 01 402 511.8 relating to hydrogen resistance in an optical fibre.

II. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims presented with the statement setting out the grounds for appeal. The set of claims concerned included independent claim 1, worded as follows:

"1. An optical fiber comprising a high concentration germanium layer which is disposed at a central position of the optical fiber and contains germanium oxide in a concentration of 0.1% by weight or more, relative to the total weight of the high concentration germanium layer, and a low concentration germanium layer which is disposed around the high concentration germanium layer and contains germanium oxide in a concentration of less than 0.1% by weight, relative to the total weight of the low concentration germanium layer,
characterized in that
the ratio of optical power leaking from the high concentration germanium layer (1) to the low concentration germanium layer (2) in an employed wavelength band is 0.4% or less, relative to the total optical power propagating through the optical fibre, an external diameter of the high concentration germanium layer (1) is at least 2.6 times that of a mode field diameter in an employed wavelength band, and a dopant other than germanium oxide is added together

with the germanium oxide in the high concentration germanium layer (1)."

III. In the decision under appeal reference was made to the following document

D1 EP-A-0 772 061.

Claim 1 as presented to the examining division contained the features of the claim recited in section II above, down to "propagating through the optical fibre". In other words, the last two features were not present in the claim, i.e. those beginning "an external diameter…" and ending "…in the high concentration germanium layer (1)."

In its reasoning, the division remarked that document D1 discloses an optical fibre comprising a high concentration germanium layer comprising a core and inner cladding disposed at a central position of the optical fibre as can be seen at 10 and 22 in Figure 1. Germanium oxide is in a concentration of 0.1% by weight in relation to the total weight of the high concentration germanium layer and there is a more highly doped core. A low concentration germanium layer 17 is disposed around the high concentration layer, the concentration being less than 0.1% by weight because it is due only to inherent diffusion.

These features correspond to the features placed in the preamble of the claim by the applicant/appellant.

IV. The division was, furthermore, of the opinion that the subject matter of the independent claim presented to it

did not involve an inventive step having regard to the disclosure of document D1. The division pointed to the page 3, lines 17 to 18 and page 4, lines 37 to 39 concerning the inner cladding layer 22 having a diameter such that an appreciable portion of light propagates in this diameter. As germanium serves as a barrier to hydrogen, a logical consequence is that the thicker the doped inner cladding layer, the less loss causing hydrogen can penetrate into the core. Choice of outer diameter of an inner cladding disclosed in document D1 amounts thus to no more than a matter of optimisation depending on level of hydrogen protection required in use, which does not amount to an inventive step. Document D1 discloses a loss value of 0.03 dB/km in Table 1 on page 4. A skilled person knows, however, which loss values are required for communication lines, the value of 0.01 dB/km said to be attained by the invention is not the only desirable value to be reached, but is only one of many which would be selected, depending, for example, on the length of fibre between repeaters or different natural environments more or less subject to hydrogen. In optimising to the desired level of hydrogen protection an external diameter of the high concentration germanium layer being at least 2.6 times the mode diameter, or equivalently a power leak from the high concentration germanium layer of less than 0.4% is achieved.

During the examination procedure, the examining division had also observed in point B.2 and 4 of its communication dated 10 September 2002, that since in document D1 (page 5, lines 2-3) dopants other than germanium oxide may be added in high concentration germanium layers in order to control refractive index

of the layer, such subject matter lacks an inventive step. Although dopants disclosed in document D1 enable increase in refractive index, other known dopants may be used to decrease refractive index.

V. The case of the appellant in support of its position can be summarised as follows.

The appellant conceded that by doping germanium oxide into the inner cladding region of the optical fibre as disclosed in document D1 an improved hydrogen resistance property similar to that disclosed in the application may be obtained. However, the freedom of setting the refractive index profile will be reduced due to germanium oxide which has an effect of increasing the refractive index. By adding dopant, such as fluorine, together with the germanium oxide, an optical fibre having a complex refractive index profile can be produced while maintaining an improved hydrogen resistance property, due to a properly set external diameter of the high concentration layer. For example, in Figure 5A and 5B, the refractive index at the outermost portion of the high concentration germanium layer would have been higher, had fluorine not been added. Thus, according to the invention presented in the amended claim on appeal, it is possible to set the ratio of optical power leaking to the low concentration germanium layer to 0.4% or less and obtain a fibre which can be practically used, i.e. to set the loss level equivalent to the requirement of 0.01 dB/km or less. There is no suggestion of the range of power leakage in document D1, so that the effects of the invention cannot be expected therefrom. Claim 1 defines

thus an inventive step with respect to document D1 and a patent should be granted.

VI. Consequent to an auxiliary request of the appellant, oral proceedings were held by the board. In a communication annexed to the summons the board informed the appellant that it had serious doubts about the appeal case presented.

The board questioned the clarity of the claim, but in view of the very similar dimensions of the fibre as disclosed in document D1 (see, for example, the values given in Figure 1 or page 3, line 45 et seq.) in comparison with the values given in the present application (e.g. examples on page 8 of the published specification), the board, nevertheless, found no reason to doubt the position of the examining division in relation to inventive step. The focus of the appeal is on the addition of a dopant other than germanium oxide. However, it is known from document D1 that refractive index can be controlled by additions of dopants. The very general last feature of the claim would not therefore appear to be sufficient to introduce an inventive step into the subject matter of the claim.

VII. In reply to the summons, the appellant informed the board that it would not be attending the oral proceedings. The appellant did not offer any substantive reply to the doubts raised by the board in its communication.

Reasons for the Decision

1. The appeal is admissible.

2. A fibre having a loss value of 0.03 dB/km is disclosed in document D1. The appellant has drafted claim 1 to reflect its view that the features of the preamble of the claim correspond to those disclosed by this document. As indicated in the summons to oral proceedings, use of dopants other than germanium oxide is also known as such from document D1. However, the features relating to parameter values (diameter and power leak) recited in the characterising part of the claim are not explicitly disclosed in document D1. The problem addressed by these features is to provide a fibre which can meet a lower loss level requirement, which, in practice, is said to be equivalent to the requirement of 0.01 dB/km or less rather than 0.03 dB/km.

3. The board concurs with the view of the examining division, that resistance to hydrogen loss can obviously be reduced by optimising the diameter of the inner clad 22 depending on the level of protection required. The amendment in relation to the "at least 2.6 times" diameter feature introduced on appeal amounts to no more than positive recitation of the result of optimisation and is equivalent to the "less than 0.4%" power leak feature present in the claim refused by the examining division because both are equivalently met in the course of an optimisation. The board further concurs with the examining division, that a desired value of loss of 0.01 dB/km amounts to no more than one of many, situation or regulatory

authority dependent values. Selecting this or indeed another one of such values in the present case cannot therefore be considered to be other than obvious, a specific recitation of the value in document D1 is not necessary to make this so. Thus, no inventive step can be considered involved in optimising the inner cladding diameter and equivalently the power leak so as to attain the value of 0.01 dB/km and indeed, the appellant has conceded that by doping germanium oxide into the inner cladding region of the optical fibre as disclosed in document D1, an improved hydrogen resistance property similar to that disclosed in the application may be obtained. In view of the foregoing, the board sees no reason to diverge from the negative conclusion on inventive step reached by the examining division following its considerations relating to the power leakage in the decision under appeal.

4. The very general last feature of the claim, the remaining feature introduced on appeal, does not specify the nature of the dopant other than germanium oxide added in the high concentration germanium layer and does not therefore go beyond what is suggested in the disclosure of document D1. For example, it is not specified that the dopant is fluorine, or any other dopant which reduces refractive index. Consequently, this feature does not permit any conclusions about any effect of the other dopant in, for example, setting the refractive index profile. In the subject matter claimed, there is not even any specific refractive to index profile or its contour. The board does not therefore consider the very general last feature concerned sufficient to introduce an inventive step into the claim. Accordingly, the board reached the conclusion

that the subject matter of claim 1 cannot be considered to involve an inventive step within the meaning of Article 56 EPC. Therefore, the request of the appellant does not succeed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar The Chairman

E. Görgmaier A. G. Klein