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Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : Methods, apparatus and articles for optical fiber systems

Klassifikation / Classification / Classement : G02B 7/26

ENTSCHEIDUNG / DECISION

vom / of / du 30 June 1988

Anmelder / Applicant / Demandeur : Raychem Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56 EPC

Schlagwort / Keyword / Mot clé : Non-inventive use of known device for known product without adaptation measures; prejudice, long-felt need and commercial success.

Leitsatz / Headnote / Sommaire

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Case Number : T 38/87

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 30 June 1988

Appellant : Raychem Corporation
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Menlo Park California 94 025 (US)

Representative : Dlugosz, Antony Charles et al.
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Decision under appeal : **Decision of Examining Division 041 of the European Patent Office dated 10 September 1986 refusing European patent application No. 82 302 158.9 pursuant to Article 97(1) EPC**

Composition of the Board :

Chairman : K. Lederer
Members : H. Reich
G.D. Paterson

Summary of Facts and Submissions

I. European patent application 82 302 158.9 (publication number 0 063 954), claiming priority of an US application, was refused by decision of the Examining Division on the ground of lack of inventive step in the sense of Article 56 EPC.

II. The decision under appeal was based on Claims 1 to 17 filed on 15 January 1986. Claims 1 and 2 were independent claims directed to a method of feeding an optical signal into an optical fibre, and a method of withdrawing an optical signal from an optical fibre, respectively. In each claim the optical fibre comprised a core, a cladding and a buffer.

III. The reason given for the refusal was that the subject-matter of independent Claims 1 and 2 differed from the methods known from document DE-A-2 626 839 (D1), in that an optical signal was fed and withdrawn "through the buffer". This diverging measure would be obvious in view of the explicit statement in the paragraph bridging pages 6 and 7 of document D1, that the amount of withdrawn light can be enhanced by removing the buffer from the optical fibre. The statement would imply to a skilled person that it is not necessary to strip the buffer, if a smaller amount of light is sufficient. The Applicant's submissions relating to a long-felt want and commercial success would not be able to replace the missing inventive step.

Furthermore, the Examining Division had mentioned documents: US-A-3 982 123 (D2) and US-A-4 270 839 (D3), but regarded these documents as less relevant with respect to the method claims under consideration.

IV. The Appellant lodged an appeal against the decision. During the appeal the Appellant proposed amended main claims directed to a tapping device for withdrawing an optical signal from an optical fibre, by way of main and subsidiary requests.

V. Oral proceedings were held before the Board at the end of which the Appellant requested that the decision under appeal be set aside and that a patent be granted:

(a) as a main request, with Claims 1 and 2 as filed during the oral hearing and with description and drawing which formed the basis for the appeal as set out in the grounds of appeal but with amended pages 4 and 7 as filed at the oral hearing;

(b) as an auxiliary request, with Claim 1 as filed at the oral hearing and with description and drawing as in the main request but with amended pages 4, 7 and 9 as filed at the oral hearing.

VI. Claim 1 of the main request has the following wording:

"A tapping device for withdrawing an optical signal from an optical fibre of a telecommunication system, which device comprises:

(a) an optical fibre comprising a core, a cladding and a buffer,

(b) a detection means for detecting said withdrawn signal, which means is a piece of a telecommunication apparatus, e.g. a telephone or a computer,

(c) a bend of an intermediate portion of the optical fibre, and

(d) an optical coupler (28) which has been applied to said bend and which conforms to the surface of the buffer and exerts pressure on the fibre, the coupler and the bend being so arranged that a desired proportion of an optical signal in the fibre is withdrawn, the withdrawn signal being withdrawn through the buffer and then through the coupler."

Claim 2 is dependent on Claim 1.

VII. Claim 1 of the auxiliary request reads as follows:

"A tapping device for withdrawing an optical signal from an optical fibre of a telecommunication system, which device comprises:

(a) a first optical fibre comprising a core, a cladding and a buffer,

(b) a second optical fibre positioned for receipt of a signal from the first optical fibre,

(c) a detection means for detecting said withdrawn signal, which means is a piece of a telecommunication apparatus, e.g. a telephone or a computer, the detection means being positioned at the other end of the second optical fibre,

(d) a bend of an intermediate portion of the first optical fibre, and

(e) an optical coupler (28) which has been applied to said bend and which conforms to the surface of the

buffer and exerts pressure on the fibre, the coupler and the bend being so arranged that a desired proportion of an optical signal in the first fibre is withdrawn, the withdrawn signal being withdrawn through the buffer and then through the coupler and fed into the second optical fibre."

Claim 1 is the only claim of the auxiliary request.

VIII. With regard to his main request the Appellant argues mainly as follows:

(a) The inventive contribution of the present application would not be a question of selecting a particular optical fibre but concerns the basic design of a tap, allowing that the buffer has not to be removed from the cladding of the core.

(b) Chapter IV of the book: J. Geisler, G. Beaven, J.P. Boutruche: "Optical Fibres", Pergamon Press (annex A17), as well as the forty-nine documents filed as annex A16 to the grounds of appeal clearly show that there existed a prejudice to withdraw an optical signal through a buffer. Tapping devices would have been known very exceptionally without removal of the buffer. In some of the known tapping devices even the cladding would have been removed. In particular, it could be derived from the document GB-A-2 170 928 (last document of annex A16), column 1, lines 43-47, that it was common practice to remove the buffer from the fibre at least until the present application has been published.

(c) Nevertheless, the Appellant does not exclude the possibility that a skilled man would have known

that light could be extracted through a buffer at a bend. He is, however, convinced that it would not be obvious for a skilled man to place there a tapping device for a telecommunication system, because of the following disadvantages, which would in particular arise when using the tapping device known from document D2 for a fibre with unremoved buffer:

(i) Buffer and cladding consist of different material. There is a risk that the plastic of the buffer delaminates from the bent glass of the cladding in long time use, resulting in an unreliable tapping device.

(ii) With a buffer on the cladding, it would be still more difficult to exactly determine the positions in a bend from which the light would radiate away.

(iii) The buffer would attenuate the withdrawn light signal.

(iv) The teaching in document D2, column 2, lines 32 to 45, to match the refractive index of the coupler material to that of the cladding would represent a clear instruction to remove the buffer.

(d) A combination of the subject-matter of documents D2 and D3 would not result in a tapping device according to Claim 1 because of the following different functioning of the tapping device known from document D3:

(i) The bend is provided outside the lightpipe and is thus not applied to the coupler (light-pipe). The

bend exclusively serves to convert core modes of optical signals which pass through the fibre from the right to the left, into cladding modes. The cladding modes are withdrawn from the fibre, not in the bend region but within the straight fibre region within the lightpipe.

(ii) The buffer is left in the bend region in order to act as an absorber for the leakage of optical signals, which pass through the fibre from the left to the right (column 2, lines 44-52).

(e) Selecting the closest prior art from a multitude of prior published documents would be hindsight.

(f) The claimed subject-matter involved an inventive step in particular because the evidence annexed to the grounds of appeal showed:

(i) that the state of the art pointed away from the invention;

(ii) that there had been a long-felt need for a satisfactory tapping device, and

(iii) that the invention had a great commercial success.

IX. Concerning his auxiliary request, the Appellant presented the following arguments:

(a) The presence of the second optical fibre between the coupler applied to the first fibre and the detector allowed a greater freedom in the positioning of the detectors in particular it enabled the detectors, in

a tele-communication system not to be placed under street level.

(b) Due to the fact that a relatively large detector is needed in order to collect all the light withdrawn by the coupler in the bend region, a skilled person would not think to replace the large detector by a fibre, representing only a tiny needle.

(c) Moreover, it would not be obvious to try to couple light radiating away from the bend of a first fibre into a second fibre, because an accurate alignment of the limited core of acceptance of the second fibre would appear to be too difficult.

Reasons for the Decision

1. The Appeal is admissible.

2.1. There is no objection to the current set of claims as far as Article 123(2) EPC is concerned, since it is adequately based on the original disclosure.

2.2. However, it should be noted that in the priority documents concerning the first filing of the present application in the United States of America, the optical fibre to which the coupler is applied is only disclosed as comprising a core and a cladding, and has no buffer. Furthermore, there is no disclosure in said priority documents of a second optical fibre between the coupler and the detector. Thus, the claims of the Appellant's main and auxiliary request can only have the priority of the European filing date: 27 April 1982. For this reason document D3 has to be considered as prior art for the purpose of Article 54(2) EPC.

3. Novelty

3.1. Document D2 (Figure 6 and the corresponding description) describes "a tapping device for withdrawing an optical signal from an optical fibre of a telecommunication system, which devices comprises: (a) an optical fibre (62) comprising a core and a cladding (column 8, lines 17-19), (b) a detection means (64) for detecting said withdrawn signal, which means is a piece of a telecommunication apparatus, e.g. a telephone or a computer (column 1, lines 14-18 and 53-61), (c) a bend (column 8, line 31) of an intermediate portion of the optical fibre, and an optical coupler (68) which has been applied to said bend and which conforms to the surface (column 8, lines 28-35) and exerts pressure on the fibre (column 8, line 36), the coupler and the bend being so arranged that a desired proportion of an optical signal in the fibre is withdrawn, the withdrawn signal being withdrawn through the cladding and then through the coupler (column 8, lines 30-39).

The device according to Claim 1 of the main request differs from that known from document D2 in that the optical fibre additionally comprises "a buffer" so that the optical coupler conforms not to the surface of the cladding but "to the surface of the buffer" and the withdrawn signal being additionally "withdrawn through the buffer".

The device according to Claim 1 of the auxiliary request differs from that known from document D2 in that the optical fibre additionally comprises "a buffer" and in that the device comprises "a second optical fibre positioned for receipt of a signal from the first optical fibre" (cf. feature "b")" the detection means being positioned at the other end of the second fibre" (cf.

feature "c") and "the withdrawn signal being withdrawn through the buffer and fed into the second optical fibre" (cf. feature "e").

3.2. The tapping device known from document D1 lacks, with regard to the subject-matters of Claims 1 of the main and the auxilairy request the same features as document D2and additionally the feature that the optical coupler "exerts pressure on the fibre".

3.3. In the tapping device known from document D3 the optical coupler is not applied to the bend but to a straight region of the fibre outside the bend.

3.4. The remaining cited documents are less relevant to the claimed subject-matter.

3.5 For the reasons given above, the subject-matter of Claim 1 according to the main request and that of the unique claim according to the auxiliary request are considered novel.

4. Inventive step

4.1. Main request

4.1.1. As shown above in point 3.1, all constructional elements of the tapping device itself are known from document D2. The subject-matter of Claim 1 differs from this known tapping device only in the structure of the fibre to which the known device is applied, which fibre structure comprises additionally a buffer on its cladding. The Appellant has admitted in the description, page 17, lines 6-9, that optical fibres comprising a core, cladding and a buffer have been commercially available at the European filing date of the present application.

4.1.2. The Board regards the known, commercially available fibres which comprise a core, a cladding and a buffer as the prior art from which a skilled person would start. In the Board's view, the objective technical problem underlying the present application with regard to the current claimed subject-matter is to withdraw a desired proportion of an optical signal from such fibres.

This problem is known in the art and solved by using a light pipe a straight region of which is in contact with the fibre (cf. document D3, in particular column 4, lines 24 to 31).

4.1.3. Thus, the question of inventive step reduces to the question whether it was obvious to a skilled person to try if a different tapping device such as known from document D2 can also be applied to a commercially available fibre with a buffer without stripping the buffer from the section where the light is to be extracted from, i.e. to replace fibre 62 of Figure 6 of document D2 for instance by the known fibre with a polyacrylate buffer mentioned in the description of the application, page 17.

4.1.4 Contrary to the Appellant's view in point VIII-a above, there is no design feature of the claimed tap which could be regarded as an inventive contribution. All structural features of the tap claimed in Claim 1 are known from document D2.

No further constructional elements are necessary in order to arrive at the subject-matter of Claim 1 from the prior art, in particular no features of the device known from document D3. Therefore, the Board regards the Appellant's arguments based on document D3 (points VIII-d to VIII-dii) not relevant to the question whether the use of the device known from document D2 is obvious. Document D3 states

moreover that buffers are not only known in the form of light absorbers but can also be transparent and thus left on the cladding in the withdrawal region of the signal. Thus, in document D3, buffer removal in the withdrawal region is regarded as a measure within the discretion of the expert, depending on the coefficient of absorption of the buffer material which is used. Polyacrylates being generally known to be transparent, document D3 would, in the Board's view, confirm to the skilled person, that he may use the tapping device known from document D2 at least for the fibre according to the Appellant's preferred embodiment without buffer removal, because light absorption is independent from a straight or a bend form of the buffer material.

4.1.5. The Board is not able to accept the Appellant's submission in point VIII-e above that the selection of a relevant document, such as document D2 would be hindsight, because it belongs to the same special technical field as the subject-matter of Claim 1, and under the well-established jurisprudence of the Boards of Appeal such a document is therefore supposed to be known to the competent expert; concerned with the objective technical problem underlying the claimed invention.

4.1.6. The documents on which the Appellant bases his argument of a prejudice against light withdrawal through a buffer of an optical fibre (point VIII -b above) present a great variety of tapping devices for fibres without buffers and some known tapping devices wherein the buffer is removed from that part of the fibre which is applied to the coupler surface. In the Appellant's evidence, however, there is nowhere a comment on any difficulties in the functioning of a tapping device wherein light is withdrawn through the buffer. In order to demonstrate the existence of a prejudice with regard to the subject-matter of Claim

1, these documents would have to contain a statement of a technical obstacle, which would discourage a skilled person from using the tapping device known from document D2 for optical fibres having a buffer, without removing it. No such discouraging statement can be found. It would have been the onus of the Appellant to demonstrate the existence of a prejudice; see also T119/82, OJ EPA 1984, 217, point 14.

4.1.7. The relative by simple construction of the tap known from document D2 as well as its known capacity to control the amount of light which is withdrawn by control of the applied pressure, would in the Board's view invite a skilled person to make use of this tap for optical fibres on the market.

In the Board's view, it belongs to a skilled person's routine work to find out whether a known technical means in his own special technical field is suited for the technical result which he wants to achieve, as long as he exclusively makes use of the known properties of the known means.

Using the device known from document D2, a skilled person will know that an application of this tap causes a part of the intensity of an optical signal to radiate away from the cladding in the bend region. The only question which remains open to him will be, whether the light escaping from the cladding will penetrate through a buffer and enter into the coupler. In order to answer this question he will also consult the prior art and find out that a buffer may attenuate the withdrawn signal (document D1, page 6 last paragraph and page 7 first paragraph), and that in the event of a transparent buffer this attenuation is negligible (document D3, loc. cit.). The Appellant has moreover admitted that a skilled person would know that

light can be extracted through a buffer in a bend; see point VIII-c. The absorption properties of the buffer are not specified in Claim 1. Therefore, a skilled person would be expected to foresee that in the event that he would select an absorptive buffer material, he would have to take into account a certain further intensity loss (see also point VIII-ciii above) in order to be able to make use of the known advantages of the buffer with regard to the protection of the fibre against break and corrosion. Maintaining the buffer, a skilled person would also tolerate a possible longtime delamination and an indefinite local spread of the emission, such as mentioned in points VIII-ci and VIII-cii above. In any event, the Appellant has not shown that he has overcome these difficulties.

The Board regards such an acceptance of certain known disadvantages in order to be able to make use of certain advantages as a compromise between conflicting parameters which results in no surprising effect and which therefore is to be regarded as obvious; see in this connection Decision T 36/82, OJ EPO 1983, 269.

4.1.8. The refractive indices of core, cladding, buffer and coupler are not mentioned in Claim 1. Nevertheless, the integration of the buffer into a system of well-matched refractive indices appears to the Board to be an adaptation measure which falls within the normal skill on the fibre expert. Thus, being able to properly select a suitable refractive index for the buffer also , such selection would be no reason for a skilled person to dispense with the technical advantages of the buffer in the withdrawal region; see also point VIII-civ above.

4.1.9. Among the numerous prior art documents of the Appellant's evidence, only documents D1, D3 and US-A-4 054 366,

mentioned in annex A16, relate to an optical fibre with a buffer. The Board regards this number of documents as too small to demonstrate convincingly that the prior art moved away from the invention in that in these known devices the buffer was removed; see point VIII-fi above. The Board is more inclined to interprete the buffer removal in this prior art by the particular needs of the use which made any loss of light intensity in the buffer undesirable.

The Appellant has not specified what technical drawback makes the known tapping devices, according to his opinion, unsatisfactory, and what property renders it satisfactory. Thus, the Board is not able to accept the Appellant's argument that there was a long felt need for a satisfactory tapping device; see point VIII-fii above. Without specification of the property of the means, for which a long felt need is advanced, the Appellant's argument can only be considered generally in the sense of creating a better device. An improvement of known devices, however, is the normal task of the skilled man at any time and implies nothing inventive.

The Appellant's argument on commercial success in annex A25 of the grounds of appeal, page 9, is based on an estimate for the future. The numerals on page 26 of annex A24 are related to the Appellant's integral share in the market, and the numerals on page 2 of annex A23 concern the Appellant's search fund for software. Thus, the Board is unable to derive from the filed evidence data which clearly demonstrates that commercial success was based on the Appellant's allegedly inventive contribution to the prior art, i.e. on the fact of not removing the buffer.

For the above reasons the Board finds that the subject-matter of Claim 1 of the main request does not involve an inventive step within the meaning of Article 56 EPC.

4.2. Auxiliary Request

4.2.1. The subject-matter additionally contained in Claim 1 of the auxiliary request with regard to Claim 1 of the main request concerns a second fibre inbetween coupler and detector. Therefore, the question of inventive step of Claim 1 of the auxiliary request reduces to an investigation of the fact whether the provision of this second fibre is inventive.

4.2.2. The idea of solving the problem of detecting an optical signal remote from a read tap of a first optical fibre by placing a second optical fibre between the coupler of this tap and a detector, belongs in the Board's opinion to the normal abilities of the competent optical fibre expert.

4.2.3. Claim 1 of the auxiliary request is restricted to this general concept and contains no further details of it. Also, the description does not disclose any embodiment showing how a remote signal detection via a second fibre has to be carried out. In particular, the application documents do not disclose how the Appellant has solved the problems of unbalanced size relation between coupler and second fibre and of aperture alignment. For these reasons, the Board regards the Appellant's arguments in points IX-b and IX-c above to be not relevant.

4.2.4. Thus, the subject-matter of Claim 1 of the auxiliary request is considered not to involve an inventive step within the meaning of Article 56 EPC.

5. Hence, it follows that Claim 1 of the main request and Claim 1 of the auxiliary request are not allowable under Article 52(1) EPC.

6. Claim 2 of the main request is sub-ordinated to Claim 1 and for this reason also not allowable.

Order

For these reasons, it is decided that:

the appeal is dismissed.

The Registrar: The Chairman:

F. Klein K. Lederer