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D E C I S I O N
of 16 October 1997

Case Number: T 0950/93 - 3.4.2

Application Number: 87400115.9

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Title of invention:
Optical fibre cable

Applicant:
AT&T Corp.

Opponent:
-

Headword:
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Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

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Case Number: T 0950/93 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 16 October 1997

Appellant: AT&T Corp.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 27 August 1993 refusing European patent application No. 87 400 115.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: S. V. Steinbrener
L. C. Mancini

Summary of Facts and Submissions

I. The appellant lodged an appeal against the decision of the Examining Division to refuse European patent application No. 87 400 115.9.

The Examining Division held that although the subject matter of claim 1 was novel, it nevertheless did not involve an inventive step within the meaning of Article 56 EPC in view of the following documents:

D1: US-A-4 331 378
D2: GB-A-2 096 343
D4: GB-A-1 568 178, and
D7: EP-A-0 169 647.

During the appeal proceedings, the Board considered the following further documents

D8: "Wire and Cable Coaters' Handbook", E.I. du Pont de Nemours & Co., Wilmington, Delaware 1968, pages 21 and 22, and
D9: US-A-4 474 830

which were either submitted by the appellant with his letter dated 29 June 1992 (document D8) or cited in the present application (document D9).

II. In the communication of 9 June 1997 pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board referred to problems existing under Articles 123(2) and 84 EPC, respectively, with respect to new claims 10 and 11 filed with the appellant's statement of the grounds of appeal. Moreover, taking account of the available prior art, the claimed subject matter seemed to lack the inventive step required by Articles 52 and 56 EPC.

III. With its letter of 3 September 1997, the appellant filed an amended set of claims 1 to 10. In a further letter dated 5 September 1997, the appellant's representative however informed the Board that his client had lost interest in the present patent application, and that he therefore would not attend the oral proceedings appointed at the appellant's auxiliary request. He declared that the appellant would "rely on the Technical Board of Appeal for the decision".

IV. Oral proceedings took place on 16 October 1997 in the appellant's absence. At the end of the oral proceedings the Chairman pronounced the Board's decision to dismiss the appeal.

V. The present decision is based on the latest version of claims as submitted with the appellant's letter dated 3 September 1997. The wording of claim 1 reads as follows:

"1. An optical fibre cable comprising in combination:

- (a) an optical fibre which includes a core, a cladding and a protective ultraviolet cured coating which is disposed around said cladding;

- (b) at least one fibrous strength member contiguous with the ultra-violet cured coating of said optical fibre, said at least one fibrous strength member which includes a plurality of filaments assembled together without twist, covering, without intended stranding, a substantial portion of the periphery of said optical fibre, the arrangement being such that any load applied to the optical fibre cable is immediately transferred to said at least one fibrous strength member,

and said at least one fibrous strength member extending in a direction substantially along a longitudinal axis of the optical fibre, whereby microbending losses are reduced;

- (c) a jacket made of a plastic material, which is tubed with a controlled drawdown over and is in a compressive contact with said at least one strength member, and has a wall thickness of about 150 to 200 µm."

Claims 2 to 7 are appended to claim 1. New method claims 8 to 10 have been added.

VI. In its letter dated 3 September 1997, the appellant argued in support of patentability of new claim 1 as follows:

The problem solved by the present invention is to make a cable which is small in size.

Until now, one skilled in the art thought that it was necessary to have a thick jacket. In D1, example 2, the final cable has an outside diameter of 2375 µm and the jacket is 1150 µm thick. In example 1, the cable is 1875 µm thick, the thickness of the jacket being 775 µm. The cable according to the invention has an outer diameter of 875 µm, i.e. about an order of magnitude less than the one of example 2 in document D1.

It is the appellant's merit to have found out that it is possible, even if the optical fibre has a small diameter, to reduce the thickness of the jacket provided one uses fibrous strength members assembled without twist and a controlled draw-down.

Reasons for the Decision

1. *Articles 84 and 123(2) EPC*

Claim 1 now under consideration differs from preceding claim 1 as filed with the appellant's statement of grounds by

(i) deleting in paragraph (c) the last feature after "strength member", and

(ii) adding the new feature "and has a wall thickness of about 150 to 200 µm" instead.

By amendment (i), the appellant reacted to the Board's preliminary view expressed in the above-mentioned communication that the deleted feature had no limiting effect but appeared self-evident and therefore was not relevant at all. The new feature according to amendment (ii) is disclosed at page 8, lines 32 to 34 of the original application documents. Since the Board had no objections under Articles 84 and 123(2) EPC against preceding claim 1, such objections do also not exist against present claim 1.

2. *Articles 54 and 56 EPC*

2.1 In the Board's view, document D1 comes closest to the subject matter of claim 1, said document disclosing

an optical fibre cable comprising in combination

- (a) an optical fibre which includes a core, a cladding and a protective coating which is disposed around said cladding (see D1, claim 1: features (A) - (C); the fact that there may be a

protective "layer" or "coating" between the "sheath" or "cladding" and the "reinforcement" or "strength member" is expressly confirmed in D1 at column 4, lines 20 - 27);

- (b) at least one fibrous strength member contiguous with the protective coating of said optical fibre and covering, without intended stranding, a substantial portion of the periphery of said optical fibre, the arrangement being such that any load applied to the optical fibre is immediately transferred to said at least one fibrous strength member,

and said at least one fibrous strength member extending in a direction substantially along a longitudinal axis of the optical fibre, whereby microbending losses are reduced (see D1, claim 1: feature (D); column 3, lines 17 to 43);

- (c) a jacket made of a plastic material (see D1, claim 1: feature (E); column 3, lines 44 to 61).

Therefore, the subject matter of claim 1 differs from this prior art in substance only in that

(i) the protective coating is ultra-violet cured whereas D1 does not specify the type of curing but refers to copolyetherester material instead (see D1, claim 9);

(ii) the filaments of said at least one fibrous strength member are assembled together without twist whereas D1 only mentions the fact that the "reinforcement" or "strength member" preferably consists of "separate bundles of fibres, i.e.

yarns", these yarns being positioned substantially parallel to the core along its longitudinal axis and having zero twist (see column 3, lines 17 to 30);

(iii) the jacket is tubed with a controlled draw-down over, and in compressive contact with, said at least one strength member, whereas D1 does not specify the coating process used for jacket formation but only refers to conventional extrusion methods (see D1, column 3, lines 46 to 61); and

(iv) the jacket has a wall thickness of about 150 to 200 µm, whereas wall thicknesses are not explicitly indicated in D1, and the thickness derivable from example 1 of D1 appears to be different (see item 2.3.3 below).

2.2 Since also none of the remaining documents discloses the claimed thickness range for the jacket wall (feature (iv)), the subject matter of claim 1 must be considered novel with respect to the available prior art (Article 54 EPC).

2.3 In the Board's understanding, the above features (i) to (iv) serve different purposes, and a synergetic effect does not exist as can be seen from the following discussion (see also page 3, last paragraph of the present application in this context).

2.3.1 Features (ii) and (iii) are more or less implicit to a skilled person from the disclosure in D1:

Since the prior art "fibres" generally extend along the core axis and are to be held under tension without twist (see D1, column 3, lines 17 to 30), one would readily assume that such a configuration is also

provided for the "individual" fibres of a "bundle of fibres" or "yarn" in accordance with the preferred embodiment of D1, i.e. following the clear teaching of D1 in this respect, the individual fibres of said "yarns" should also be assembled together without twist (feature (ii)). In any case, such bundles of filaments assembled together without twist as "straight" reinforcements to improve the overall load-bearing properties of optical fibre cables (see page 3, lines 11 to 20 of the present application) are described in document D4 (see page 1, line 65 to page 2, line 12; Figures 5 and 6 and associated text) and would be considered for an optical fibre cable according to D1 without exercising inventive skill.

Having regard to feature (iii), in the Board's opinion it is evident that the prior art jacket must also be in a controlled compressive contact with the strength member, otherwise the latter could not be held under tension (see D1, feature (E) of claim 1 and column 3, lines 46 to 48). Furthermore, it appears doubtful whether the additional process steps in feature (iii) relating to tubing extrusion and draw-down control are capable of characterising the finished product. However, even if this were the case, then tubing extrusion seems to be one of only two conventional alternatives (see e.g. D4, page 3, lines 53 to 73 or D8, pages 21 and 22) which a skilled person would consider for the extrusion process mentioned in D1.

2.3.2 Protective ultra-violet cured coatings in accordance with the above feature (i) and their use for reducing microbending losses in optical fibres are already disclosed in document D9 (see column 1, lines 9 to 19 and column 4, lines 47 to 64). Therefore, application

of such coatings to an optical fibre cable of the type known from D1 for microbending prevention (see page 3, line 35 to page 4, line 1 of the present application) seems to be obvious.

2.3.3 According to the appellant, remaining feature (iv), which has been added to the latest version of claim 1, serves the purpose of reducing the cross section of the optical fibre cable. However, the passage of the description referred to by the appellant (page 3, line 28 of the present application corresponding to page 2, line 33 of the **priority document** apparently cited by the appellant) does not seem to relate cable size to thickness of the jacket wall but rather to the thickness of an internal "buffer layer" (see page 3, lines 6 to 8). The effect of the claimed thickness range for the jacket wall is not clearly apparent from the present application (see page 8, lines 32 to 37), i.e. whether the reduced outer diameter of the cable is due to a smaller jacket wall thickness or to an internal cable structure of shrunk dimensions. Taking account of the passages at page 9, lines 10 to 13 and 26 to 33 and page 10, lines 10 to 13 of the present application, it must rather be assumed that the thickness of the jacket wall is important in the context of strippability, i.e. easy removal of the coverings for connectorisation, and depends on the amount of draw-down.

In D1, no explicit thickness values are disclosed. However, there is a clear indication that the jacket serves to hold the "reinforcement" under tension and that, with this proviso, the material for the jacket is not critical. According to the prior art, considerations governing the choice of jacketing material should include strength, elongation, burning rate and ease of strippability (see D1, column 3, lines 44 to 61).

Therefore, starting from the desired compression, a skilled person would design the jacket wall in accordance with the remaining requirements known from D1, in particular strippability. In the Board's view, the adjustment of the wall thickness in this context would appear to fall within a cable expert's competence.

Moreover, from example 1 of D1, the following dimensions appear to be plausible:
outer diameter of coated optical fibre 600 µm;
total thickness of strands 500 µm (outer diameter of hypodermic needle 2050 µm - inner diameter of needle 1550 µm); and

outer diameter of cable 1875 µm so that the total thickness of the jacket is 775 µm (1875 µm - 600 µm - 500 µm) leading to a wall thickness of about 387 µm.

For example 2 of D1 the dimensions, in particular the thickness of any strands, appear to be less clear so that in the Board's view no unambiguous conclusions can be drawn from this passage of the prior art.

Nevertheless, the dimensions of example 1 clearly show that the claimed thickness range for the jacket wall is similar to, and at least of the same order of magnitude as, conventional thickness values.

2.3.4 The appellant's argument based on the total outer diameter of the cable "according to the invention" as compared to that of example 2 in D1 is neither correct (the difference being not an order of magnitude but less than a factor of 3) nor relevant since this diameter is not specified in claim 1 and depends on the thicknesses of the cable's various constituents which are also not specified in said claim.

.../...

2.4 In consequence, in the Board's opinion, the subject matter of claim 1 lacks the inventive step required by Articles 52 and 56 EPC, and claim 1 is not considered allowable for this reason.

3. Since the appellant has requested a decision in accordance with the Board's present assessment of the case, the appeal has to be dismissed as a consequence of the non-allowability of claim 1, irrespective of any allowability considerations with respect to the remaining claims.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini