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**Datasheet for the decision
of 11 July 2011**

Case Number: T 0676/09 - 3.4.02

Application Number: 02728328.2

Publication Number: 1354233

IPC: G02B6/44

Language of the proceedings: EN

Title of invention:
OPTICAL FIBER CABLE

Applicant:
AFL Telecommunications LLC

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step

Decisions cited:

Catchword:
Claim 1 (main request) - inventive step (yes)



Case Number: T0676/09 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 11 July 2011

Appellant: AFL Telecommunications LLC
(Applicant) 170 Ridgeview Circle
Duncan SC 29334 (ETATS-UNIS D'AMERIQUE)
Representative: Hoarton, Lloyd Douglas Charles
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted 05 November 2008
refusing European patent application No.
02728328.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. Klein
Members: M. Rayner
B. Müller

Summary of Facts and Submissions

I. The applicant has appealed against the decision of the examining division refusing European patent application number 02 728 328.2 concerning optical fibre cable. In the examination and/or appeal proceedings, reference has been made to, amongst others, the following documents:

D1 WO-A-00/72 071
D2 FR-A-2 718 564
D3 GB-A-2 064 163.

II. In the decision under appeal, the examining division referred to its communication in which the applicant had been informed that the application did not meet the requirements of the European Patent Convention and the reasons therefor. The applicant filed no comments or amendments in reply to the communication but requested a decision according to the state of the file by a letter received in due time. The decision was then issued.

III. The reasons given in the communication of the examining division can be summarised as follows.

The subject matter of claim 1 differs from the disclosure of document D2 in that:-

- (a) a plurality of inner members is a plurality of fibre optic conduits, and
- (b) when viewed from an end of the optical fibre cable assembly, the longitudinal axis of each fibre optic conduit is positioned at a corner of one of an imaginary equilateral triangle and an imaginary square.

Should a skilled person want to increase the signal transmission capacity of the fibre optic cable of Figure 3 of document D2, he could be expected to provide further fibre optic conduits, as taught in Figure 1 or 2 of document D2. Should he want to maximise the signal transmission capacity, he would provide as many fibre optic conduits as possible, i.e. he would replace all the inner members 22 in Figure 3 by fibre optic conduits, thereby directly arriving at feature (a).

Concerning feature (b), the cable of Figure 3 of document D2 comprises six inner members that could be fibre optic conduits. Should a cheaper or thinner cable be needed, or a cable weighing less, which would be trivial wishes a skilled person could be expected to have to fulfil specific needs, he would use as many inner members or fibre optic conduits as needed to meet the needs, such as four or three inner members or fibre optic conduits. Taking into account that document D2 implicitly teaches a rotationally symmetric placement of the inner members or fibre optic conduits (see page 5, "shape of a cylindrical cross section"), the skilled person, should he choose three or four fibre optic conduits, would arrange them so that, when viewed from an end of the optical fibre cable assembly, the longitudinal axis of each fibre optic conduit is positioned at a corner of one of an imaginary equilateral triangle and an imaginary square (cf. feature (b)), since these are the most straightforward arrangements leading to rotational symmetry, if not the only possible arrangements leading to rotational symmetry. For the sake of completeness, it is noted that the skilled person could also be expected to carry out modifications of the cable of document D2 necessary arrive at feature (b), such as the omission or the

adaptation of the diameter of central member 21 in Figure 3 of document D2. This modification is considered to be a straightforward workshop modification; the adaptation of diameters of cable elements to meet design wishes is, on one hand, a matter of course, on the other hand, it is hinted to by page 4, lines 25-30. Hence, feature (b) is a pure design alternative, not involving inventive activity. It is a matter of course that the fibres and conduits are expensive, heavy, and add diameter to the cable.

Moreover, the idea of having only fibre optic conduits 5 and interstitial members 7 in the core of a optical fibre cable assembly is known from the sole figure of document D3, or from Figures 1 to 3 of document D1. This assembly obviously has the advantage of having maximum transmission capacity. Furthermore, the sole figure of document D3 shows four fibre optic conduits with the longitudinal axis of each fibre optic conduit positioned substantially at a corner of an imaginary square. Reference is made also to document D1, Figures 1 and 2, showing four fibre optic conduits with the longitudinal axis of each fibre optic conduit positioned substantially at a corner of an imaginary square, or Figure 3, which shows three fibre optic conduits, wherein the longitudinal axis of each fibre optic conduit is positioned substantially at a corner of an imaginary equilateral triangle. Should a skilled person, when making, or trying to make, a cable assembly having three or four inner members or fibre optic conduits, be unsure how to place the fibre optic conduits, he could be expected to consult document D1 or D3. Therefore, a skilled person would provide feature (b) of claim 1. Thus a cable comprising a lower number of cable elements, such as fibre conduits or inner members, would be thinner, cheaper and weigh

less. A modification of the cable leading to these effects in the claimed way is straightforward and not surprising. The reduced diameter of a cable having three or four conduits or inner members would of course lead to effects such as having less wind drag or snow accumulation. The cable would of course reduce the climate related external loads to be carried by the overhead cable or its supporting structures, i.e. the poles on which the overhead cable of document D2 would be mounted in use. The reduced weight of the cable itself also only has expected effects, i.e. easier transport of the cable, easier handling, less weight to carry by supporting structure poles. All these advantages or disadvantages can be expected when designing the cable, and therefore relate to a trade off that is not inventive.

Hence, the subject matter of claim 1 is not inventive with respect to document D2 either in combination with the common knowledge of a skilled person (Art.56 EPC) or with the teaching of document D1 or D3.

- IV. The appellant requested that the decision under appeal be set aside and a patent granted on the basis of documents according to a main or auxiliary request filed with the statement of grounds for appeal. Oral proceedings were requested on an auxiliary basis.

- V. In support of its requests, the appellant advanced arguments including the following.

Claim 1 is novel over the closest prior art document D2 as this does not disclose an optical fiber cable assembly incorporating fiber optic conduits with the longitudinal axis of each fiber optic conduit being

positioned at a corner of either an imaginary equilateral triangle or an imaginary square.

The objective technical problem solved by the invention of claim 1 is how to reduce the diameter of an optical fiber cable assembly without reducing the strength of the assembly or the number of optical fibers which can be contained within the assembly. The reduced diameter decreases the susceptibility of the optical fiber cable assembly to damage from external loads and, in addition, reduces the overall linear weight of the fiber optic cable assembly (per unit length) which in turn decreases the "self-loading" of the optical fiber cable assembly.

Figure 3 of document D2 shows a cable which comprises a central wire 21 and six surrounding inner members 22. Wires 23 of smaller diameter to the diameter of the inner members 22 are positioned in recesses between adjacent inner members 22. Wires 24 are wound around the inner members to form an outer layer. Some of the inner members 22 may contain optical fibers 22a. Figure 3 only shows one inner member 22 containing optical fibers 22a but document D2 teaches implicitly that any or all of the other inner members 22 may contain optical fibers. However, it is important to note that the cable will always be a hexacore cable, regardless of the number of inner members 22 which contain optical fibers. Therefore, the cable described in document D2 will always suffer from the problems of conventional hexacore cable (wide diameter and poor self-loading characteristics).

A person skilled in the art would not look from document D2 to D1 to try to solve the objective technical problem because document D1 relates to a

different technical field to the technical field of document D2 and the technical field of the invention of claim 1. Document D1 relates to underwater cable, whereas document D2 and the invention of claim 1 relate to self-supporting aerial cables. An underwater cable is not subjected to weather related loads, such as wind loads, ice loads and snow loads which affect aerial self-supporting cables. The teaching of document D1 is thus irrelevant to the development of self-supporting cables. Even if a person skilled in the art were to look from document D2 to D1 to try to solve the objective technical problem, the person skilled in the art would not reach the invention of claim 1 because document D1 does not teach that each grounding member should be "tangent to each fiber optic conduit and each interstitial member", as specified in claim 1. If anything, document D1 teaches away from the invention of claim 1 because the grounding members 10 disclosed in document D1 are not wound in an opposite direction to the wind direction of the inner tubes 3 (see figure 1) and so the grounding members 10 are not tangent to each inner member and each interstitial member. Document D3 discloses a cable assembly which is provided with four tubes 6 which each contain an optical fiber 5 (see figure 1). The tubes 6 are not tangent to one another and document D3 does not teach that each grounding member (wires 2,3,4) must be tangent to each tube 6. Therefore, a person skilled in the art would not think to modify the cable of document D2 to arrive at the invention of claim 1.

Therefore, an inventive step was necessary to reach the subject matter claimed.

VI. Claim 1 submitted by the appellant as main request is worded as follows.

"1. An optical fiber cable assembly comprising:
a plurality of elongated fiber optic conduits (24)
received around a longitudinally extending central axis
(32) with a longitudinal axis (26) of each fiber optic
conduit (24) extending in the same direction as the
central axis (32) and with each fiber optic conduit
(24) tangent to two other fiber optic conduits (24),
the plurality of fiber optic conduits (24) defining a
first interstitial space (33) therebetween with each
pair of adjacent fiber optic conduits (24) further
defining a respective one of a plurality of separate,
second interstitial spaces (34) surrounding the first
interstitial space (33);
a plurality of elongated interstitial members (36)
received around the central axis (32) with their
longitudinal axes (38) extending in the same direction
as the central axis (32), each second interstitial
space (34) receiving one of the second interstitial
members (36) tangent to the respective pair of fiber
optic conduits (24) defining the second interstitial
space (34), a plurality of grounding members (40)
surrounding the interstitial members (36) and the
fiber optic conduits (24) with the longitudinal axes
(42) of the grounding members (40) extending in the
same direction as the central axis (32), the plurality
of grounding members (40) arranged with each grounding
member (40) tangent to two other grounding members (40)
and a first imaginary tube which surrounds the
interstitial members (36) and the fiber optic conduits
(24) and which has a longitudinal axis coaxial with the
central axis (32)
characterised in that:
the fiber optic conduits (24) and the interstitial
members (36) are wound spirally in a first direction
around the central axis (32); and

the grounding members (40) are wound spirally in a second direction, opposite the first direction, around the central axis (32), such that at various spaced points along the length of the optical fiber cable, each grounding member (40) is tangent to each fiber optic conduit (24) and each interstitial member (36); and

wherein, when viewed from an end of the optical fiber cable assembly, the longitudinal axis (26) of each fiber optic conduit (24) is positioned at a corner of one of (i) an imaginary equilateral triangle and (ii) an imaginary square."

VII. It is not necessary to present the wording of the independent claims according to the auxiliary request for the reasons indicated in section 4 of the reasons below.

Reasons for the Decision

1. The appeal is admissible.
2. Patentability
 - 2.1 As it is concerned with a self supporting optical cable, document D2 has been taken, in the board's view correctly, to represent the closest prior art document in the examination and appeal proceedings.
 - 2.2 The problem solved by the novel features mentioned in point 2.1 is improving a self supporting cable. In particular, issues of bad weather viability of the cable with higher capacity without compromising mechanical strength are addressed. Document D2 discloses the possibility of increasing capacity of a hexacore cable, such as that shown in Figure 3, by

using more fibre conduits, but there is no suggestion of reconfiguring away from hexacore.

2.3 The examining division saw such reconfiguration as trivial to meet specific needs, but has failed to show where the problem addressed by the application is recognised or to show any teaching of another "specific need" leading to such reconfiguration to any other number, let alone specifically either three or four. In fact, the division only reaches the stage of the problem having being solved at the end of its reasoning, considering it to be a trade off of advantages and disadvantages, but never having identified the nature of the trading in its chain of reasoning. These gaps in the chain of reasoning of the examining division leads to its reasoning not persuading the board.

2.4 In fact the line of argument of the division boils down to explaining the skilled person could implement the claimed subject matter if told to do so. This can be seen from the division's analysis, which does not concern reasons why the skilled person would, on the basis of the knowledge of the skilled person or the prior art teaching, have made modifications, but sets out various hypotheses about what the skilled person wants, needs or chooses. These hypotheses are expressed in the reasoning as follows:-

"Should a skilled person want to increase the signal transmission capacity",

"Should he want to maximise the signal transmission capacity",

"Should a cheaper or thinner cable be needed",

"Should he choose three or four fibre optic conduits".

Moreover, the board does not see how a reference in the context of document D2 to a circular section in lines 25-30 on page 4 hints towards eliminating or adapting the central member 21.

The board cannot consider this approach to amount to a convincing challenge to inventive step because it resolves down, in effect, to relying on using the teaching of the application to postulate the hypotheses to define what the skilled should do, i.e. it is hindsight.

- 2.5 Documents D1 and D3 do not make the negative position of the division more convincing because their teachings do not fit together very well with that of document D2. For example, document D1 relates to a submarine cable which is rather different to a self supporting cable and therefore not relevant. The division saw this disclosure as aiding the skilled person on placing the fibre conduits, but gave no reason why the skilled person would have needed this aid. In the case of document D3, there is an indication of part of the problem because weather is mentioned in line 109 on page 1, but in the context of two or more layers of surrounding electrical conductor wires (closest to grounding members in the terminology of the application), Figure 3 as referred to by the examining division showing three layers. As there is more than one layer, the board agrees with the appellant that this disclosure does not involve each grounding member being tangent to each conduit along its length. Nor is each grounding member tangent to a first imaginary tube. Moreover, the assembly only contains four tubes with single waveguides. Thus, while the configuration disclosed may be weather resistant through strength owing to the two or more grounding layers with only

four single fibres, it can hardly be considered high capacity per unit weight. Moreover, not an imaginary tube but an extruded sheath of polymeric material is disclosed. In other words, the skilled person would be unlikely to combine the teachings of documents D2 and D3 and any such combination would require a reworking of document D2 without really solving the problem addressed or reaching the subject matter claimed in claim 1. Consequently, the negative case of the examining division on inventive step is not made even with reference to documents D1 and D3.

- 2.6 None of the other documents in the file come closer to the subject matter of claim 1 than documents D1 to D3. The board therefore reached the view that no convincing argument for lack of inventive step can be made on the basis of the prior art documents in the file. The subject matter of claim 1 can therefore be considered to involve an inventive step.
3. Furthermore, the board did not see any other ground preventing grant of a patent. The appellant's main request therefore succeeds.
4. Since the appellant's main request succeeds, it is not necessary to consider its auxiliary request in the present decision, nor are oral proceedings necessary.

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 based on the following documents:

Description

Pages 1-3, 5-12, and 14 as published,
Pages 4, 4a and 13 of the main request filed
with the letter of 10 March 2009,

Claims

No. 1-11 of the main request filed with the
letter of 10 March 2009,

Drawings

Sheets 1/3-3/3 as published.

The Registrar:

The Chairman:

M. Kiehl

A. Klein