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D E C I S I O N
of 6 February 2003

Case Number: T 0738/01 - 3.4.2

Application Number: 92925056.1

Publication Number: 0666995

IPC: G02B 6/38

Language of the proceedings: EN

Title of invention:
Optical fiber connector biasing arrangement

Applicant:
ITT MANUFACTURING ENTERPRISES, INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0738/01 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 6 February 2003

Appellant: ITT MANUFACTURING ENTERPRISES, INC.
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Representative: Esser, Wolfgang
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 16 February 2001 refusing European patent application No. 92 925 056.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: B. J. Schachenmann
Members: M. P. Stock
M. A. Rayner

Summary of Facts and Submissions

I. The appellant has appealed against the decision of the examining division refusing European patent application number 92 925 056.1 on the ground that its subject-matter lacked an inventive step within the meaning of Article 56 EPC in view of the following document:

D1: Patent Abstracts of Japan, vol. 11, No. 35 (P-542), abstract of JP-A-61 204 608.

The patent application relates to an optical fiber connector biasing arrangement employing a spring member having a leaf spring portion that includes a pair of leafs which engage a connector yoke and a terminus body, as is disclosed in D1. The examining division considered it obvious to provide the pair of leafs of this known connector with ends which are spaced apart and unjoined. According to the appellant, the novel feature has the advantageous effect of significant simplification of the installation of a terminus assembly, which was not obvious.

II. In a communication issued by the board it was stated that the claims underlying the decision of refusal cannot be considered to satisfy Articles 123(2) and 84 EPC. By way of example a copy of amended application papers dealing with these issues was attached.

III. As a response, dated 4 October 2002, to the communication of the board the appellant filed an amended set of claims 1 to 10 and requested that the decision under appeal be set aside and a patent be granted on the basis of this set of claims, amended description pages 1 and 8 and description pages 2 to 7

as originally filed. According to the appellant the amendments made follow the proposal of the board in the above communication except for one linguistic modification at the end of claim 9. The appellant agreed to the board's intention to resolve the case without oral proceedings, if possible.

With his letter, dated 24 January 2003, the appellant filed an amended page 14 containing the second part of claim 9 as amended and claim 10 and requested to replace this page.

The independent claims read as follows:

"1. An optical fiber connector (12) that includes a housing (60) having a yoke (62), for connecting to a second connector device (16), wherein said connector (12) includes a terminus assembly (31) that comprises a terminus body (40) with a front part (44) that is coupled to the front end of an optical fiber of an optical assembly (14), wherein said terminus body must be capable of moving slightly forward and rearward with respect to said yoke (62) while being biased forwardly, wherein said yoke (62) has a through hole (111) and has front and rear surfaces (102,106) facing respectively forwardly and rearwardly and spaced along said hole, wherein said terminus body (40) lies in said hole (111), and has a forward body shoulder (100) lying forward of said yoke front surface, and said connector (12) includes a spring member (80) having a leaf spring portion (81,82,83) that includes a pair of leafs (90,92), which engage said yoke and said terminus body forward shoulder to allow said terminus body to be resiliently deflectable rearwardly, characterised by:

each leaf of said pair of leafs (90,92), having

first and second opposite end parts (94,96) with said second end parts (96) spaced apart and unjoined to leave a gap (130) to receive said terminus body; said end parts (94,96) abutting said yoke front surface, and said pair of leafs lying on opposite sides of said terminus body, said pair of leafs having a forwardly bowed middle (98) that abuts said terminus body forward shoulder (100) and is resiliently deflectable rearwardly, and

said spring member (80) being movable sidewardly on said yoke front surface (102) to receive said terminus body between said leafs."

"5. An optical fiber connector (12) that includes a housing (60) having a yoke (142), for connecting to a second connector device (16), wherein said connector (12) includes a terminus assembly (31) that comprises a terminus body (164) with a front part (44) that is coupled to the front end of an optical fiber of an optical assembly (14), wherein said terminus body must be capable of moving slightly forward and rearward with respect to said yoke (142) while being biased forwardly, wherein said yoke (142) has a through hole (151) and has front and rear surfaces (176) facing respectively forwardly and rearwardly and spaced along said hole, wherein said terminus body (164) lies in said hole (151), and has a forward body shoulder (166) lying forward of said yoke front surface, and said connector (12) includes a spring member (140) having a leaf spring portion that includes a pair of leafs (160, 162), which engage said yoke and said terminus body forward shoulder to allow said terminus body to be resiliently deflectable rearwardly, characterised by: each leaf of said pair of leafs (160,162), having first and second opposite end parts (172,174) with said

second end parts (174) spaced apart and unjoined to leave a gap to receive said terminus body; said end parts (172,174) abutting said yoke front surface, and said pair of leafs lying on opposite sides of said terminus body, said pair of leafs having a forwardly bowed middle (170) that abuts said terminus body forward shoulder (166), and

said yoke having a periphery (120) and said hole (151) being in the form of a slot, that extends sidewardly to said periphery of said yoke, or is in the form of a key-hole shaped slot having a wide portion and a narrow portion, to facilitate installation of said terminus assembly, said pair of leafs extending substantially parallel to the length of the adjacent slot (151)."

"7. A method for assembling an optical fiber connector (12) that includes a housing (60) having a yoke (62), for connecting to a second connector device (16), wherein said connector (12) includes a terminus assembly (31) that comprises a terminus body (40) with a front part (44) that is coupled to the front end of an optical fiber of an optical fiber assembly (14), wherein said terminus body must be capable of moving slightly forward and rearward with respect to said yoke (62) while being biased forwardly, wherein said yoke is formed to have a through hole (111) and has front and rear surfaces (102,106) facing respectively forwardly and rearwardly and spaced along said hole, wherein said terminus body lies in said hole (111) and has a forward body shoulder (100) lying forward of said yoke front surface, and said connector (12) includes a spring member (80) having a leaf spring portion (81,82,83) that includes a pair of leafs (90,92), which engage said yoke and said terminus body forward shoulder to

allow said terminus body to be resiliently deflectable rearwardly, comprising:

forming said spring member (80) of sheet metal, each of said pair of leafs (90,92), having first and second opposite end parts (94,96) with said second end parts (96) spaced apart and unjoined to leave a gap (130) to receive said terminus body; said end parts (94,96) abutting said yoke front surface (102), and said pair of leafs lying on opposite sides of said terminus body, said pair of leafs having a forwardly bowed middle (98) that abuts said terminus body forward shoulder (100) and is resiliently deflectable rearwardly;

mounting said spring member (80) on said yoke (62);

installing said terminus body, having a rearward shoulder (104) of greater width than said yoke hole (111) in said yoke hole (111) with said terminus body forward shoulder lying forward of said yoke front surface (102) and

moving said spring member sidewardly on said yoke front surface (102) to receive said terminus body between said leafs."

"9. A method for assembling an optical fiber connector (12) that includes a housing (60) having a yoke (142), for connecting to a second connector device (16), wherein said connector (12) includes a terminus assembly (31) that comprises a terminus body (164) with a front part (44) that is coupled to the front end of an optical fiber of an optical fiber assembly (14), wherein said terminus body must be capable of moving slightly forward and rearward with respect to said yoke (142) while being biased forwardly, wherein said yoke is formed to have a through hole (151) and has front

and rear surfaces (176) facing respectively forwardly and rearwardly and spaced along said hole, wherein said terminus body lies in said hole (151) and has a forward body shoulder (166) lying forward of said yoke front surface (176), and said connector (12) includes a spring member (140) having a leaf spring portion that includes a pair of leafs (160,162), which engage said yoke and said terminus body forward shoulder to allow said terminus body to be resiliently deflectable rearwardly, comprising:

forming said yoke including forming of holes (151) comprising a slot extending sidewardly to a periphery (120) of said yoke, or forming of holes comprising a keyhole slot having a wide portion and a narrow portion;

forming said spring member (140) of sheet metal, each of said pair of leafs (160,162), having first and second opposite end parts (172,174) with said second end parts (174) spaced apart and unjoined to leave a gap (130) to receive said terminus body; said end parts (172,174) abutting said yoke front surface, and said pair of leafs lying on opposite sides of said terminus body, said pair of leafs having a forwardly bowed middle (170) that abuts said terminus body forward shoulder (166) and is resiliently deflectable rearwardly, and said pair of leafs extending substantially parallel to the length of the adjacent slot (151);

mounting said spring member on said yoke;

installing said terminus body, having a rearward shoulder of greater width than said hole (151), in said yoke hole (151) with said terminus body forward shoulder lying forward of said yoke front surface;

sliding said terminus body along said slot (151) until said middle of said pairs of leaf lies against

the terminus body forward shoulder."

Reasons for the Decision

1. *Admissibility of the appeal*

The appeal complies with the provisions of Articles 106 to 108 and Rules 1(1) and 64(b) EPC and is therefore admissible.

2. *Amendments*

Article 123(2) EPC has not been an issue in the appealed decision of refusal. However, the board is also satisfied that the amendments do not lead to subject-matter which extends beyond the application as originally filed.

3. *Inventive step*

3.1 An optical fiber connector according to the preamble of claim 1 is disclosed in D1, see figures and text of abstract. The subject-matter of claim 1 differs from this prior art in that

(a) the second ends (96) of the pair of leaves (90, 92) are spaced apart and unjoined to leave a gap to receive the terminus body (40); and

(b) the spring member (80) is movable on the yoke (62) to enable the leaves to move along the opposite sides of the terminus body until the middles (98) of the leaves lie on opposite sides of the terminus body.

3.2 These features solve the objective technical problem of mounting a terminus assembly on a yoke.

D1 addresses a similar problem, i.e. insertion of a terminus assembly (parts 12, 20, 14) into a lock spring (13).

3.3 However, the solution disclosed in D1 is based on a different concept since the leaf spring portion (arc part 17) and stopper piece 19 having the function of a yoke are in **one part**.

According to the invention the spring member and yoke are different parts. This allows insertion of the terminus body in the hole of the yoke and resilient fastening thereof with the spring member by movement of the latter on the yoke.

3.4 The examining division has argued that the skilled person would be aware of various alternative construction arrangements with the same functionality as that of D1. One such arrangement would be the construction of the curved leaf spring portion 17 and the remainder of the lock spring 13 of D1 as separate elements, with one end of the leaves separated by a gap as according to the claimed feature (a), thus permitting an alternative method of inserting the terminus body to that used in D1, leading automatically to the spring member being slidable along the yoke according to claimed feature (b).

However, in the board's view, if the lock spring 13 of D1 were divided into two parts, ie leaf spring portion 17 and yoke portion 19, a major modification would be needed to ensure that the stopper pieces 19

function as a yoke. If the leaves of spring portion 17 in D1 were provided with unjoined ends as according to the present invention, this would again contravene the function of stopper pieces 19 as a yoke since they are held in place by the joined leaves of spring portion 17.

3.5 Therefore, the board concludes that it was not obvious starting from D1 to arrive at an optical fiber connector according to the invention as claimed in claim 1 and at a corresponding method of assembling an optical fiber connector as claimed in claim 7.

3.6 Independent claims 5 and 9 are related to an optical fiber connector and a method of assembling an optical fiber connector wherein the through holes defined in claims 1 and 7 are in the form of slots extending sidewardly to the periphery of the yoke. Subject-matter based on such slots (dependent claim 2 underlying the appealed decision) has been found allowable by the examining division, see appealed decision, point 5 of the reasons. The board has no reason to doubt this finding.

3.7 Thus, the subject-matter of independent claims 1, 5, 7 and 9 involves an inventive step within the meaning of Article 56 EPC.

4. Claims 2 to 4, 6, 8 and 10 are dependent claims related to embodiments of the invention.

The description has been adapted to the claims as amended and a reference to document D1 has been introduced.

Accordingly, the board is satisfied that the documents according to the request of the appellant meet the requirements of the EPC.

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 on the basis of the following documents:

Description: Pages 1 and 8 filed with letter dated 4 October 2002;
Pages 2 to 7 as published;

Claims: 1 to 9 (first part on page 13) filed with letter dated 4 October 2002;
9 (second part on page 14) and 10 filed with letter dated 24 January 2003

Drawings: Sheets 1/4 to 4/4 as published.

The Registrar: The Chairman:

P. Martorana B. Schachenmann