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**Datasheet for the decision  
of 17 July 2012**

**Case Number:** T 1688/08 - 3.4.02

**Application Number:** 97915814.4

**Publication Number:** 1010024

**IPC:** G02B6/10, G02B6/26, // G02F1/35

**Language of the proceedings:** EN

**Title of invention:**  
AN OPTICAL ELEMENT

**Applicant:**  
Telefonaktiebolaget LM Ericsson (publ)

**Headword:**

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
- unconvincing inventive step argument based on a skilled person not conversant with the language of a prior art document deemed closest prior art and lacking an available translation

**Decisions cited:**  
T426/88

**Catchword:**



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Case Number: T 1688/08 - 3.4.02

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.02**  
**of 17 July 2012**

**Appellant:** Telefonaktiebolaget LM Ericsson (publ)  
(Applicant) 164 83 Stockholm (SUEDE)

**Representative:** Holmberg, Martin Tor  
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**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 27 March 2008 refusing European patent application No. 97915814.4 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 appealed against the decision of the examining division refusing European Patent Application number 97915814.4 (=WO-A-97/35220). The patent application concerns optical elements. In the following reference is made to documents using the notation below:-

D5 GB-A-2 207 525,  
D6 JP-A-57 056 814,

II. In a telefax dated 09 January 2008, amongst other things, the examining division objected in point 6b that claims 3 and 4 filed on 21 December 2007 were drafted as independent claims in such a way that they clearly contradicted Rule 43(2) EPC because claim 4 could easily be drafted as a claim dependent from claim 3. In a letter of 17 January 2008, amongst other things, responsive to the objection of the examination division, the appellant submitted revised claims in which claim 4 was made dependent from claim 3.

III. In the decision under appeal, the examining division considered independent claims according to the request of 17 January 2008 not to be admissible and the subject matter of claims of according to the request of 21 December 2007 to lack an inventive step. The division's reasoning can be summarised as follows.

### Requests

The request filed on 17 January 2008 was late filed and not taken into consideration. As independent claims 1 to 3 were identical to independent claims 1 to 3 as

filed on 21 December 2007, the amendments made were not considered relevant to the subject of the proceedings.

#### Inventive Step - Claim 3

The subject-matter of independent claim 3 does not comprise an inventive step over the combined teachings of documents D5 and D6. Document D6 discloses a 1xN optical coupler comprising a piece of an optical fibre 11, which has a substantially circular-cylindrical core 13, a substantially circular-cylindrical cladding 12 surrounding the core 12 of low refractive index, the region 14 inside the annular having substantially the same refractive index and composition as the cladding, the piece of an optical fibre having an input end and an output end, an optical input fibre 17 and output optical fibres 19. While document D6 does not explicitly disclose that the refractive indices of the inner and outer cladding layers are the same, this would be the obvious choice. Concerning thickness of the core layer, document D6 discloses this as being similar to the core diameter of an input/output fibre. A skilled person knows that a device according to document D6 is based on the interference of different modes because it works with high efficiency.

If a skilled person were faced with the problem of determining how the device disclosed in document D6 worked, a translation would be sought or, should this not be available, similar devices with a functional description. Document D5 discloses such a device excepting use of an annular mixer guide 45 in place of an annular core. Document D5 thus enables a skilled person to understand that the function of a coupler according to document D6 must be based on multimode interference. Moreover, the document teaches how to

design such a coupler waveguide by choosing its length according to Figure 1 and pages 5 and 6 so the skilled person would apply these teachings to the device according to document D6. As single mode fibres are typically used in optical telecommunication devices, a skilled person would use them in a device according to document D6, understanding in doing this that thickness of the annular core of the device according to document D6 is similar to the core diameter of a single mode fibre and so single mode in the radial direction. The drawings of patent applications are typically schematic and of illustrative nature only. Hence, making reference to the scaling of the drawings is not appropriate for determining whether a fibre is a multimode or a single mode. Thus, a skilled person would directly arrive at the subject-matter of claim 3 without any inventive step.

#### Inventive Step - Claim 1

From document D5, a skilled person knows that a device according to claim 3 is wavelength dependent. Therefore, it is obvious that if the operating wavelength is different from that for which the device was designed, the mode picture at the output will be different from that at the design wavelength and that such a device consequently is a filter.

- IV. The appellant requested that the decision under appeal be set aside and a patent granted on the basis of claims 1 to 7 filed on 17 January 2008.

In support of its case the appellant argued as follows.

Document D6 discloses a 2x6 coupler in Figure 2, not a 1xN coupler. It cannot in any way be assumed that the

device disclosed in D6 operates according to the particular optical multi-mode interference (MMI) principle employed in the devices described in the present patent application in which the piece of an optical fibre is multimode type in the circular direction and single mode type radially. Such a device requires, for example, a very well defined length adapted to the wavelength of the light used. In fact, the device disclosed in document D6 does not even use the basic MMI principle. The repeating rod 11 can be assumed to be multimode in all directions. In document D6 the nature of the input/output optical fibres is not described, yet from Figure 2 it can be assumed that these fibres are multimode fibres. The rod 11 appears to use a simple light distributing effect that is enhanced by its annular core.

If a skilled person not conversant with Japanese were faced with the problem of determining how the device disclosed in document D6 worked, he would look for and obtain a translation as only considering the English abstract, without knowing how the device works, would render it impossible for him to look for a similar device. At most, devices having some similarity in their very basic or general structure might be sought, but this would not be a convincing disclosure of operation of the device taught by document D6. Therefore, the skilled person would not have been convinced that the operation of the device disclosed in D6 is similar to that of the device disclosed in D5, which it certainly is not. Document D5 discloses single mode multipoint optical couplers employing an annular mixing guide. The annular mixing guide can have an optical cladding surrounding it and located inside. However, the thickness of the walls of the mixing guide is so large that it certainly is multimode in the

radial direction. It follows that it is impossible to arrive at the subject matter defined in pending claim 3 by applying the teachings of D5 to the device of D6.

The optical filter device defined in claim 1 has the special characteristic that an "output optical fibre (19) [is] connected to the output end at a place diametrically opposite the connection place of the input optical fibre with respect to the longitudinal axis of the piece of an optical fibre connected to the output end at a place diametrically opposite the connection place of the input optical fibre with respect to the longitudinal axis of the piece of an optical fibre". It has not been shown nor even discussed that such a positioning of the output fibre would be obvious to one skilled in art. Certainly, it is not disclosed or hinted at in the prior art. Hence, the device recited in claim 1 can be considered to involve an inventive step.

V. Independent claims 1 to 3 are worded as follows.

"1. An optical filter, characterized by a piece (13) of an optical fibre, which has a substantially circular-cylindrical annular core (1') together with a substantially circular-cylindrical cladding surrounding the core, the region inside the annular having substantially the same refractive index and composition as the cladding, the piece (13) of an optical fibre having an input end and an output end,  
-the piece (13) of an optical fibre being, when receiving light of predetermined wavelengths at its input end,  
-- multimode type in the circular direction, the circular direction defined by a circle perpendicular to the longitudinal axis of the piece (13) of an optical

fibre and the centre of the circle being located on the longitudinal axis, and

-- single mode type radially, in directions extending perpendicularly to the longitudinal axis, and

- the piece (13) of an optical fibre having a length adapted in such a way that, for an initial state of the piece of the optical fibre and when receiving light of the predetermined wavelengths at its input end, only for received light of a definite interval of wavelengths included in the predetermined wavelengths, the mode picture of light produced at the cross section of the end surface at the output end is substantially a mirrored or reflected image of the mode picture existing at the cross section of the end surface at the input end, the mirroring or reflecting taken in relation to in a plane passing through the longitudinal axis,

so that for providing light into the piece (13) of an optical fibre from an input optical fibre (15) connected to the input end with the core (1'') of the input optical fibre connected to or located at a portion of the annular core (1') of the piece (13) of an optical fibre, only light of the definite wavelength interval is received by an output optical fibre (19) connected to the output end at a place diametrically opposite the connection place of the input optical fibre with respect to the longitudinal axis of the piece of an optical fibre.

2. A sensor or switch, characterized by a piece (13) of an optical fibre, which has a substantially circular-cylindrical annular core (1') together with a substantially circular-cylindrical cladding surrounding the core, the region inside the annular having substantially the same refractive index and composition



as the cladding, the piece of an optical fibre having an input end and an output end,

- the piece (13) of an optical fibre being, when receiving light of predetermined wavelengths at its input end,

-- multimode type in the circular direction, the circular direction defined by a circle perpendicular to the longitudinal axis of the piece (13) of an optical fibre and the centre of the circle being located on the longitudinal axis, and

-- single mode type radially, in directions extending perpendicularly to the longitudinal axis, and

- the piece (13) of an optical fibre having a length adapted in such a way that, for an initial state of the piece of the optical fibre and when receiving light of the predetermined wavelengths at its input end, only for received light of a definite interval of wavelengths included in the predetermined wavelengths, the mode picture of light produced at the cross section of the end surface at the output end is substantially a mirrored or reflected image of the mode picture existing at the cross section of the end surface at the input end, the mirroring or reflecting taken in relation to in a plane passing through the longitudinal axis,

- the piece (13) of an optical fibre being arranged to be deformed mechanically from its initial state, so that for providing light into the piece (13) of an optical fibre from an input optical fibre (15) connected to the input end with the core (1'') of the input optical fibre connected to or located at a portion of the annular core (1') of the piece (13) of an optical fibre, light of the definite wavelength interval is received by an output optical fibre (19) connected to the output end at a place diametrically opposite the connection place of the input optical

fibre with respect to the longitudinal axis of the piece of an optical fibre, the intensity of the received light being changed when the piece (13) of an optical fibre is deformed mechanically from its initial state, so that this change of light intensity and thereby the mechanical deforming can be detected by a detector (23) connected to the output optical fibre (19).

3. A 1 x N optical coupler, characterized by a piece (13') of an optical fibre, which has a substantially circular-cylindrical annular core (1') together with a substantially circular-cylindrical cladding surrounding the core, the region inside the annular having substantially the same refractive index and composition as the cladding, the piece of an optical fibre having an input end and an output end,

- the piece (13') of an optical fibre being, when receiving light of predetermined wavelengths at its input end,

- multimode type in the circular direction, the circular direction defined by a circle perpendicular to the longitudinal axis of the piece (13') of an optical fibre and the centre of the circle being located on the longitudinal axis, and

- single mode type radially, in directions extending perpendicularly to the longitudinal axis, and

- the piece (13') of an optical fibre having a length adapted in such a way that, for an initial state of the piece of the optical fibre and when receiving light of the predetermined wavelengths at its input end, only for received light of a definite interval of wavelengths included in the predetermined wavelengths, the mode picture of light produced at the cross section of the end surface at the output end is substantially an N-fold image of the mode picture existing at the

cross section of the end surface at the input end, so that for providing light into the piece (13') of an optical fibre from an input optical fibre (15) connected to the input end with the core (1") of the input optical fibre connected to or located at a portion of the annular core (1') of the piece (13') of an optical fibre, only light of the definite wavelength interval can be received by output optical fibres (27, 29) connected to the output end at places corresponding to the N images of the light distribution input from the input optical fibre (15)."

### **Reasons for the Decision**

1. The appeal is admissible.
  
2. Appellant's present request for grant of a patent on the basis of claims 1 to 7 filed on 17 January 2008 had been dismissed by the examining division under Rule 137(3) EPC on the ground that admission of the request would not have changed the decision of the examining division since claims 1 to 3 were unchanged from the previous version and the amendments therefore were not relevant to the proceedings (see point 1 of the Reasons for the Decision). The present request had been amended only in respect of claim 4 to render it dependent so as to meet a corresponding objection of the examining division.

Given that the board may arrive at an assessment of claims 1 to 3, which differs from that of the examining division, the board considers that appellant's request can be admitted into the appeal proceedings.

3. In relation to claim 3, the division assumed that the skilled person knows that a device according to

document D6 is based on the interference of different modes because it works with high efficiency, as set out in the corresponding English abstract, but did not explain how such knowledge relates to a number of features in the claim, for example, to the radial single mode. In fact, in the context of high efficiency, all that the abstract of document D6 discloses is simply "To reduce the insertion loss, to equalize the photo coupling, and to execute it with high efficiency, by using a repeating rod having a cylindrical optical conductor part whose thickness is similar to the core diameter of an input/output fibre". Moreover, the division considered it not possible to determine scaling from the drawings of patent applications as they are typically schematic and of illustrative nature only. In other words, the division could determine neither core diameters nor fibre lengths from the drawing and did not show how, without knowledge of the subject matter claimed, the skilled person's knowledge provides such features.

4. Since the division did not find all the claimed features in Japanese-language document D6 and assumed that the skilled person did not understand Japanese, the division removed inconsistencies with the claimed subject matter by reference to the teaching of document D5. This approach is not very convincing because the language of a patent document alone cannot be decisive for the question of whether or not the skilled person considers the technical content of that document. Otherwise, there would be a differentiation between skilled persons according to the language(s) they speak. This would be against the objective assessment of the inventive step. (See, by analogy, T 426/88, OJ EPO 1992, 427, at point 6.4.) In the board's view, it is not credible either that the skilled person would

have believed that another document, such as document D5, having only some features not dissimilar to those actually disclosed in document D6, would correspond to the disclosure of document D6 in relation to subject-matter claimed. This lack of credibility leads to a gap in the chain of reasoning of the examining division, the gap then leading the board not to be persuaded by the case of the division.

5. The board does not disagree with the case of the appellant on inventive step and is therefore satisfied that the subject matter of independent claims 1 to 3 can be considered to involve an inventive step.
  
6. In view of the foregoing and since the board sees no other bar to grant of a patent, the board considers it appropriate to exercise powers within the competence of the first instance and order grant of a patent (Article 111(1) EPC).

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

#### Description:

Pages 1-6 as published.

#### Claims:

No. 1-7 filed by telefacsimile received on 18 January 2008 and dated 17 January 2007 (sic).

#### Drawings:

Sheets 1/5-5/5 as published.

The Registrar:

The Chairman:



M. Kiehl

A. Klein

Decision electronically authenticated