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**Datasheet for the decision  
of 27 March 2014**

**Case Number:** T 1936/09 - 3.4.02

**Application Number:** 98924330.8

**Publication Number:** 986769

**IPC:** G02B6/42

**Language of the proceedings:** EN

**Title of invention:**

METHOD AND LIGHT GENERATING APPARATUS FOR OPTICAL FIBER USE

**Applicant:**

Oy MTG-Meltron Ltd.

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
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Case Number: T 1936/09 - 3.4.02

**D E C I S I O N  
of Technical Board of Appeal 3.4.02  
of 27 March 2014**

**Appellant:** Oy MTG-Meltron Ltd.  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 30 April 2009  
refusing European patent application No.  
98924330.8 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman:** A. Klein  
**Members:** F. Maaswinkel  
D. Rogers

## Summary of Facts and Submissions

I. The appellant lodged an appeal against the decision of the examining division, refusing the European patent application 98924330.8. This patent application relates to a method for cooling a fibre optics illumination device and a corresponding apparatus.

II. According to the decision, the subject-matter of method claim 1 did not involve an inventive step within the meaning of Article 56 EPC having regard to the disclosure in document D2 and the additional features disclosed in document D4:

D2: EP-A-0 638 766

D4: US-A-5 099 399

III. With the letter containing the grounds of appeal the appellant requested to set aside the decision and to grant a patent on the basis of the sets of claims according to the Main Request or Auxiliary Request filed with this letter. The appellant also filed an auxiliary request for oral proceedings.

IV. In a Communication pursuant to Rule 100(2) EPC the board raised objections under Article 84 EPC.

V. With a letter dated 25 October 2012 the appellant filed a new set of claims and amended description pages and requested that a patent be granted based on the following documents:

Claims: 1 to 6, filed with the letter dated 25 October 2012;

Description: pages 1 to 9, filed with the letter dated 25 October 2012;

Drawings: sheets 1/4 to 4/4, as published.

VI. The wording of independent claim 1 reads as follows:

"Method for optical fiber use,

wherein light that is generated by means of a light generating apparatus, is led by exploiting an optical fiber by directing light to the end of the optical fiber (2) for leading the light further by the optical fiber (2), wherein

inside a uniform and essentially closed casing structure (5) are arranged:

a cooling space (5b) which is placed at one end of the casing structure (5) for cooling an input end (2a) for the light of the optical fiber (2),

a lamp space (5a) inside of which said light generating means (1) are placed and which is separated by an intermediate wall (5b') from the cooling space (5b),

a light opening (A) in the intermediate wall (5b') whereby an input end (2a) for the light of the optical fiber (2) is provided at the light opening (A), and

at least one blower (3b) arranged opposite to the cooling space at the other end of the casing structure (5) and leading the cooling air flow (w) out from the casing structure (5), preferably as a flow-through, through an end wall (5x) of the casing structure (5) opposite to the cooling space (5b),

characterized in that

the cooling space (5b) has a perforated back wall (5y) at a point of the cooling space (5b) which enables passage of air through the same into the cooling space (5b),

that the cooling space (5b) is cooled by means of a Peltier-unit (3a) acting as a cooling device (3), wherein

the cold side of said Peltier-unit (3a) is arranged in connection with one or several internal surfaces of said cooling space (5b), and

the warm side of the Peltier-unit (3a) is arranged in connection with one or several outer surfaces of the casing structure (5), and in that

a guiding assembly (6) is arranged to the intermediate wall (5b'), carried out by edges of the light opening (A) directed towards said light input end (2a), and provides a passage of the cooling air flow (w) in the cooling space (5b) to the light input end (2a) of the optical fiber (2), whereby

a cooling air flow (w) is led by the blower (3b) by means of forced convection from the cooling space (5b) via the guiding assembly (6) to the lamp space (5a) ".

The wording of independent claim 4 reads as follows:

"Apparatus for optical fiber use, comprising

light generating means (1) meant for directing light to an end of an optical fiber (2) for leading light further by the optical fiber (2) and

a uniform and essentially closed casing structure (5) inside of which are placed:

a cooling space (5b) which is placed at one end of the casing structure (5) for cooling an input end (2a) for the light of the optical fiber (2),

a lamp space (5a) inside of which said light generating means (1) are placed and which is separated by an intermediate wall (5b') from the cooling space (5b),

a light opening (A) in the intermediate wall (5b') whereby an input end (2a) for the light of the optical fiber (2) is provided at the light opening (A), and

at least one blower (3b) arranged opposite to the cooling space at the other end of the casing structure (5) and leading the cooling air flow (w) out from the casing structure (5), preferably as a flow-through, through an end wall (5x) of the casing structure (5) opposite to the cooling space (5b),

characterized in that

the cooling space (5b) has a perforated back wall (5y) at a point of the cooling space (5b) which enables passage of air through the same into the cooling space (5b), that

the apparatus comprises a Peltier-unit (3a) acting as a cooling device (3) for cooling the cooling space (5a), wherein

the cold side of the Peltier-unit (3a) is arranged in connection with one or several internal surfaces of the cooling space (5b), and

the warm side of the Peltier-unit (3a) is arranged in connection with one or several outer surfaces of the casing structure (5), and in that

a guiding assembly (6) arranged to the intermediate wall (5b') and carried out by edges of the light opening (A) directed towards said light input end (2a), provides a passage of the cooling air flow (w) in the cooling space (5b) to the light input end (2a) of the optical fiber (2), whereby

a cooling air flow (w) is led by the blower (3b) by means of forced convection from the cooling space (5b) via the guiding assembly (6) to the lamp space (5a) ".

Claims 2, 3, 5 and 6 are dependent claims.

VII. The appellant's arguments may be summarised as follows:

The amended claims are basically the same as those considered in the decision, which were not objected to under Article 123 EPC. The major changes are the revised two-part form of the independent claims with their preambles now reflecting the disclosure in document D3 (US-A-4 665 707), which is considered to disclose the closest prior art. Features of former claims 2 and 6 have been included into claims 1 and 4 in order to have the complete structure of the components of the apparatus as disclosed in citation D3 in the preamble of the new independent claims. The former feature of the detailed arrangement of the light generating means that these are "...formed by a lamp and objective assembly as well as by electronics to operate the light generating means" has been deleted from the independent claims, in conformity with the original specification, page 1, first paragraph, which recites the former preamble to claim 1 taking into account the state of the art of document WO 89/03539. As to the feature that the guiding assembly "directs" the airflow to the input end of the optical fibers, this wording is originally disclosed on page 4, last three lines. Therefore the set of claims should be in conformity with the provisions of Rule 43(1) EPC and Article 123(2) EPC.

With respect to the issue of patentability, novelty of the former claims has not been questioned in the decision. Instead lack of inventive step was argued starting from the disclosure in document D2 as the closest prior art. This apparatus, however, has no means at all to cool the air flow which is directed to

the front end of the optical fibers in order to give some cooling thereof. Furthermore, in this device the air flow is directed across the transformer 31 and can, therefore, not give an effective cooling to the front end of the fibers which lies downstream of the transformer in the direction of the air flow. Finally, the air flows from the blower 37 across the transformer 31 to the front end 21 of the fibers and, thereafter, to the light source 25, hence there is no convection stream at the end of the fibers.

In the apparatus disclosed in document D3, the cooling space (*defined by the thermal bushing 21, the cooling fins 23 and closed by the reflector 14*), the light source 2 and the blower (*fan 25*) are arranged in this sequential order, and the air stream 27 flows into the apparatus at the end of the cooling space and exits behind the blower 25 through openings 27c. This is reflected by the preambles of the independent claims. In contrast to the invention, D3 does not show any cooling means for cooling the air stream. Rather, the air stream 27 is just external cooling air 27 (see D3, col. 4, line 13). Furthermore, the air stream is not concentrated to the opening where the end of the fiber structure is located. Rather, the air stream flows through the aperture of the reflector 14, along the light source 2 and through the ventilation holes 28. Therefore, D3 has no cooling means to cool down the air flow, let alone a Peltier-unit, nor does this document disclose a guiding means comparable to the guide assembly as defined in the characterising portion of the independent claims.

Document D4 just teaches that Peltier-elements can be used to cool down an air stream in a computer environment. In this apparatus the cooled air is



transferred through various conduits to the electric parts which are to be cooled.

Starting from document D3, it is the objective technical problem to provide a compact and most efficiently cooled light generating apparatus. This objective is achieved by (1) providing a Peltier-element in combination with the cooling space as claimed in the first characterizing feature of the independent claims and (2) to provide a guiding means for guiding the cooled down air stream pointedly to the front end of the optical fiber arrangement. In order to assemble all the features of the new independent claims like a mosaic - which is not allowed - one would have to pick the apparatus of D3, add a Peltier-element to the apparatus to cool down the air flow and pick the guiding means from D2 for providing the guiding means to direct the air flow to the front end of the optical fiber arrangement. It is apparent that this kind of cherry picking of the various elements from the state of the art involves inadmissible hindsight.

Furthermore, a combination of documents D3 and D4 would not lead to the sub-combination of a cooling chamber and the Peltier-effect of the invention, because a combination of D3 and D4 would just mean that a conduit leading to the thermal bushing 21 of D3 to feed the air stream 27 into the apparatus would lead to a Peltier-cooling arrangement as disclosed in D4. Also the step of integrating the Peltier-element into the cooling space as defined in the claims would be missing in such a combination.

In view of the above, the subject matter of the new claims has a sufficient level of inventive step to be patentable.

## Reasons for the Decision

1. The appeal is admissible.
2. Amendments

The board is satisfied that in the set of claims according to the present Main Request the objections under Article 84 EPC raised by the board in its Communication of 27 June 2012 have been overcome. The application documents also comply with the provisions of Article 123(2) EPC.

3. Patentability- novelty and inventive step

- 3.1 Claim 1 - Document D2

- 3.1.1 In the decision document D2 was considered as the starting point for the issues of novelty and inventive step. With reference to the embodiment in Figure 4 and col. 4, lines 10 to 54, this document was found to disclose a method for optical fiber use, wherein light that is generated by means of a light generating apparatus (*lamp 61*) is led by using an optical fiber (*cable of fibres 63*). Inside a uniform and essentially closed casing structure (*cylindrical outer housing 51*) are arranged:

- a cooling space at one end of the casing structure (*51*) (*low end of device in Figure 4*), placed essentially apart from a lamp space (*at the opposite end and behind baffle 59*), the cooling space and the lamp space being separated by an intermediate wall (*baffle 59*); said cooling space being cooled (*by ventilation with the outside, ambient air*);

- a light opening 66 in the intermediate wall 59, providing a light opening for the optical fiber (*at mounting structure 65*); and
- a blower (*fan 57*).

The examining division also identified the following feature in this apparatus:

- a guiding assembly being arranged at the intermediate wall (*baffle 59*) and carried out by edges of the light opening (*the edges of baffle 59, which direct cooled air over the fiber ends*) providing a passage of the cooling air flow in the cooling space to the light input end of the optical fiber and being directed towards said light input end, the cooling air flow being generated by the blower 57.

3.1.2 According to decision of the examining division, the differences between the device of D2 and one according to the claim are the following:

- (i) The device of claim 1 uses a Peltier element to provide the cool air; and
- (ii) The fan of the claim is at the opposite end of the device to the fan of D2, i.e. it blows instead of sucking.

Hence, in the opinion of the examining division, the subject-matter of claim 1 was novel over the disclosure in document D2. The board concurs with this position.

3.1.3 With respect to inventive step, the examining division reasoned that the features (i) and (ii) solved two independent objective technical problems:

- (i) Improving the cooling of the device of D2; and
- (ii) an alternative position of the fan of the device of D2.

3.1.4 With respect to problem (i) the examining division argued that it was known from document D4 that if ambient air was not sufficient for cooling a device, the cooling could be improved by using a Peltier element. This should be mounted with its warm side at the outside wall and its cool side at the inner wall of the device.

With respect to the alternative position of the fan (*problem ii*) the skilled person knew that the fan may be placed either behind the fibers ("*blowing mode*", as in document D2) or behind the lamp ("*sucking mode*", as in document D3). Therefore choosing one of these well known alternatives did not involve an inventive step.

3.1.5 The appellant has submitted:

- Document D2 does not disclose any cooling means to cool the air flow;
- In the embodiment of Figure 4 of D2, the air flow passes around the transformer 31 which dissipates heat and therefore heats the passing flow;
- because of the flow through the baffle and the central aperture, there is no convective stream at the end of the fibers.

3.1.6 The board concurs with the appellant that the apparatus in Figure 4 of document D2 does not include an active cooling unit. It is also noted that the particular lighting apparatus disclosed in this document has been conceived for exterior installations to provide aesthetically-pleasing area lighting as well as to supply high-intensity light flux to optical fibers for instance in buildings, landscapes, swimming pools and the like (see D2, col. 1, l. 3 - 6, Section "*Field of the Invention*"; also col. 1, l. 11 - 13). Therefore,

although the problem of cooling the high-intensity illuminated fibers is addressed (*col. 1, 1.22 - 23*), according to document D2 this problem is solved by including a fan to force ambient air to flow into the outer housing 51 (*col. 2, 1. 9 - 17; also col. 4, 1. 26 - 32 in the embodiment of Figure 4*). Hence, *a priori*, it is not obvious why, for the particular application envisaged in document D2 (*exterior installations etc., see supra*), the skilled person would consider to include an active cooling device such as a Peltier element.

3.1.7 With respect to the position of the blower (*fan 57 in the embodiment of Figure 4 of document D2*) it appears that this has been deliberately arranged in the lower portion of the outer housing to force ambient air to flow into the outer housing 51 and through the baffle and reflector structure 59, toward the lamp 61, and out through the dome 55 (*col. 4, lines 26 - 31 and lines 37 - 42; see also claim 2 of D2*). In particular in the embodiment in Figure 4 of D2 it is not apparent that the cooling effect of the blower would be improved if it was to be positioned above the baffle, rather such a positioning would appear to be disadvantageous because of obstruction of the other elements (*central aperture 66, lamp 61; color wheel 69 and associated drive motor 71*).

3.1.8 Therefore, in the opinion of the board, the skilled person would not be motivated to modify the apparatus disclosed in document D2 as argued in the decision of the examining division and the subject-matter of claim 1 is therefore not obvious having regard to the disclosure in document D2.

3.2 Document D3

- 3.2.1 In the Grounds of Appeal the appellant has submitted that document D3 discloses the closest prior art and has accordingly cast the claims in the two-part form. The board concurs with the appellant that the features of the preamble of claim 1 can be identified in the apparatus disclosed in document D3, e.g. the embodiment shown in Figure 2.
- 3.2.2 With respect to the features of the characterising part of claim 1 it is observed:
- in the apparatus of D3, the cooling space has a back wall being provided with one or more passages 22 enabling passage of air through the same into the cooling space (*thermal control bushing 21*);
  - the cooling space does not include an active cooling device;
  - at the intermediate wall (*apertured reflector 14*) the light input end of the optical fiber (*glass rod 9*) is arranged at the centre of the aperture without a guiding assembly as defined in claim 1.
- 3.2.3 These differences solve the technical problem of improving the cooling of the prior art fiber optics illuminator.
- 3.2.4 In the board's opinion, starting from the disclosure in document D3, the particular solution defined in claim 1 is not obvious. It is true that document D4 discloses to use a Peltier-effect element as a heat pump for cooling an electronics device. However, the particular solution for the heat pump proposed in this document includes two heat removal fans 24 and 26, the first removal fan 24 forcing a portion of the intake air across the hot side heat sink 28; and the second removal fan 26 forcing a portion of the intake air

across the cold side heat sink 28 (see document D4, col. 5, lines 15 - 27). It does not appear straightforward to include this heat pump in the illumination device of document D3 and, in addition, its inclusion would not correspond to the technical features of the Peltier-unit arrangement as defined in claim 1.

Furthermore it is equally questionable that the skilled person would contemplate to modify the intermediate wall, the function of which is performed by the apertured reflector 14 in the device of document D3, by the guiding assembly as defined in claim 1. It is noted that this reflector 14 has the double function of protecting the rod against rays 7b not contributing to a useful illumination (*which are reflected as rays 7c*) and ensuring the maximum optical efficiency in combination with the light source, see col. 4, lines 29 - 35.

- 3.3 It is concluded that the subject-matter of method claim 1 is novel and involves an inventive step.
- 3.4 The same conclusion can be drawn for independent claim 4, which defines an apparatus for optical fiber use with the technical features for carrying out the invention.
- 3.5 Claims 2, 3, 5 and 6 are dependent claims and are equally allowable.
4. For the above reasons, the board finds that the appellant's Request meets the requirements of the EPC and that a patent can be granted on the basis thereof.

## **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:

Claims: 1 to 6, filed with the letter dated 25 October 2012;

Description: pages 1 to 9, filed with the letter dated 25 October 2012;

Drawings: sheets 1/4 to 4/4, as of the application as published.

The Registrar:

The Chairman:



M. Kiehl

A. Klein

Decision electronically authenticated