

BESCHWERDEKAMMERN
DES EUROPÄISCHEN
PATENTAMTS

BOARDS OF APPEAL OF
THE EUROPEAN PATENT
OFFICE

CHAMBRES DE RECOURS
DE L'OFFICE EUROPEEN
DES BREVETS

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 27 June 2007**

Case Number: T 0650/05 - 3.4.03

Application Number: 99969286.6

Publication Number: 1140626

IPC: B64D 47/02

Language of the proceedings: EN

Title of invention:
IR diode based high intensity light

Patentee:
AlliedSignal Inc.

Opponent:
OSRAM Opto Semiconductors GmbH & Co. OHG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
-

Decisions cited:
-

Catchword:
-



Case Number: T 0650/05 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 27 June 2007

Appellant: AlliedSignal Inc.
(Patent Proprietor) 101 Columbia Avenue,
P.O. Box 2245
Morristown
New Jersey 07962-2245 (US)

Representative: Haley, Stephen
Gill Jennings & Every LLP
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

Respondent: OSRAM Opto Semiconductors GmbH & Co. OHG
(Opponent) Wernerwerkstraße 2
D-93049 Regensburg (DE)

Representative: Epping - Hermann - Fischer
Patentanwalts-gesellschaft mbH
Ridlerstraße 55
D-80339 München (DE)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 22 March 2005
revoking European Patent No. 1140626 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: T. Bokor
Members: G. Eliasson
E. Wolff

Summary of Facts and Submissions

- I. This is an appeal against the decision of the opposition division revoking European patent 1 140 626 for lack of an inventive step.
- II. The following prior art documents, among others, were considered in the decision under appeal:
- D3: US 3 805 347 A;
D4: E. Hecht, "Optik", Addison-Wesley 1989, pages 136 to 140;
D6: DE 196 49 650; and
D10: US 4 803 689 A.
- III. With the statement of the grounds of appeal, the appellant proprietor filed new claims-requests.
- IV. The respondent opponent filed the following new documents with his response to the statement of grounds:
- D12: US 5 195 102 A;
D13: US 4 338 577 A; and
D14: US 5 446 750 A.
- V. The oral proceedings before the board were held in the absence of the appellant proprietor, who had informed the board that he would not attend the oral proceedings.
- The appellant proprietor requested in writing that the decision under appeal be set aside and a patent be maintained as granted (main request) or on the basis of the first or second auxiliary requests filed with the statement of the grounds of appeal.

The respondent opponent requested that the appeal be dismissed.

VI. Claim 1 as granted and forming the main request reads as follows:

"1. A light assembly (10, 30, 80, 90) comprising:
a thermally conductive housing (12, 32, 82), the housing (12, 32, 82) having a bottom portion (22) and a top portion (24), the housing defining a hollow (26);
an IR diode (16, 36, 60) adapted to emit infrared light; characterized by:
an aspheric lens (18, 38) connected to the top portion of the housing (12, 32, 82), the aspheric lens (18, 38) adapted to collimate infrared light, wherein infrared light emitted by the IR diode (16, 36, 60) radiates through the hollow (26) to the aspheric lens (18, 38);
a thermally conductive base (14, 34, 50), the base (14, 34, 50) located at the bottom portion (22);
and
the IR diode (16, 36, 60) being connected to the base (14, 34, 50)."

VII. Claim 1 of the first auxiliary request differs from that of the main request in that the following paragraph is added at the end:

"at least one thermal electric cooler (20, 40, 70) connected to the IR diode (16, 36, 60), the at least one thermal electric cooler (20, 40, 70)

adapted to dissipate heat generated by the IR diode (16, 36, 60)"

VIII. Claim 1 of the second auxiliary request differs from that of the main request in that the passage

"a thermally conductive base (14, 34, 50), the base (14, 34, 50) located at the bottom portion (22); and the IR diode (16, 36, 60) being connected to the base (14, 34, 50)"

is replaced by (board's emphasis to indicate difference with respect to the first auxiliary request):

"a thermally conductive base (14, 34, 50), the base (14, 34, 50) located at the bottom portion (22) and the IR diode (16, 36, 60) being connected to **but electrically isolated from**, the base (14, 34, 50); and at least one thermal electric cooler (20, 40, 70) connected to the IR diode (16, 36, 60), the at least one thermal electric cooler (20, 40, 70) adapted to dissipate heat generated by the IR diode (16, 36, 60)".

IX. The appellant proprietor presented essentially the following arguments in support of his requests:

- (a) Document D3 would not be considered by a skilled person seeking to address the problems addressed by the present invention, since document D3 related to packages of a kind produced before the development of injection moulded packages

currently in use. The "diode element" 11 in document D3 corresponded to the piece nowadays referred to as the "die" of an LED package which would not at the priority date of the patent be interpreted as "light emitting diode".

- (b) Document D3 was not directed towards the problems of overheating in IR diode systems. It was known to the skilled person that IR light sources had their own set of problems distinguished from those of visible light sources. Therefore, the skilled person would have no motivation whatsoever to consider document D3 for solving the problem of overheating in modern IR light assemblies. The choice of metal as material for the casing had nothing to do with conducting heat away from the diode, as the LED of document D3 produced light of low intensity and hence produced little heat.
- (c) Neither document D4 nor D6 provided any teaching in relation to problems with overheating in IR light assemblies and furthermore lacked any teaching that an aspherical lens would have any advantage over any other type of lens.
- (d) Regarding the second auxiliary request, none of the cited prior art taught the combination of a thermo electric cooler and an IR diode electrically isolated from a thermally conductive base. In fact, the operation of the device in document D3 depended on the base 12 being electrically connected the diode 11.

- X. The respondent opponent presented essentially the following arguments:
- (a) The publication date of document D3 was irrelevant for the question of closest prior art and the "could-would" approach was for this question irrelevant.
 - (b) The arguments relating to the higher power LEDs used in the patents should be disregarded as claim 1 does not specify high power LEDs. There were no features in claim 1 which would lead to a better heat transfer than that of the device of document D1. In particular, the only characterising features relating to the aspherical shape of the lens could not be attributed to an improved heat transfer.
 - (c) Documents D4 and D6 were relevant for solving the problem of finding a suitable infrared lens for the device of document D3. Document D6 disclosed in particular an aspherical lens for an IR-LED.
 - (d) As to the first auxiliary request, document D10 disclosed a semiconductor laser assembly where a thermo electric cooler was used to keep the laser at a constant temperature. Such coolers were also known from documents D12 to D14. Furthermore, document D12 disclosed an insulating diamond plate 33 between the heat sink 30 and the laser diode 38 relevant to the second auxiliary request (Figure 2).

- (e) Claim 1 of the second auxiliary request specifying an IR diode *electrically isolated* from the base contravened Article 123(2) EPC, since the application as filed merely disclosed that the IR diode could be *isolated* from the base (see page 6, lines 29 to 30).
- (f) Notwithstanding the above, the appellant proprietor had failed to indicate any technical problem that the feature of having the IR diode electrically isolated from the base would solve. Hence in accordance with the Guidelines C-IV, 9.8.2, this feature was not to be considered relevant for the assessment of inventive step.

Reasons for the Decision

1. The appeal is admissible.
2. *Documents filed subsequently*

Documents D12 to D14 were filed by the respondent opponent in response to the statement of the grounds of appeal and were therefore filed outside of the opposition period. Since these documents were filed at least partially in response to the new claim requests filed with the statement of the grounds of appeal and the appellant proprietor did not object to their introduction into the appeal procedure, the board admits documents D12 to D14 into the procedure.

3. *Inventive step - Main Request*

3.1 Document D1 which was considered closest prior art in the decision under appeal, discloses a light assembly comprising a cylindrical metal housing 18 defining a hollow (see Figures 1 and 2; 2, lines 23 to 37). A metal base 12 is located at the bottom portion of the housing 18 and a lens 21 is connected to the top portion of the housing. Since the housing and base are made of metal, they are thermally conductive as well. A light-emitting diode (LED) 11 is mounted on the base 12. The lens 21 collimates the light emitted from the LED (column 2, lines 65 to 68). The LED can be an IR diode emitting infrared light (see column 1, lines 10 to 16).

3.2 The subject matter of claim 1 of the main request thus only differs from the device of document D3 in that the lens is aspherical, whereas document D3 does not disclose which type of focusing lens 21 to use (see D3, column 2, lines 36 and 37).

3.3 The appellant proprietor disputed that document D3 should be considered closest prior art due to its old publication date and that the type of LED package disclosed in document D3 was outdated (see item IX(a) above).

The board is not persuaded by the above arguments. Firstly, as the respondent opponent pointed out, the age of a document only plays a role in the question whether it should be considered closest prior art or not, when it relates to an obsolete technology. This is not the case here, since metal can packages for IR diodes of a similar type to that shown in Figures 1 and

- 2 of document D3 are still produced and offered for sale.
- 3.4 Having regard to document D3, the technical problem (Problem I) addressed by the claimed invention thus relates to finding a suitable lens for collimation of IR light emitted from the IR diode.
- 3.5 The board finds persuasive the assessment of the opposition division in the decision under appeal that at the priority date of the patent, the skilled person would consider the use of aspherical lenses for the device of document D3, as aspherical lenses were known in the art in LED applications (see D4, and D6, column 4, lines 41 to 44), and in particular, since aspherical lenses were known in the art to have better optical properties than corresponding spherical lenses (see the discussion in document D4).
- 3.6 For the above reasons, in the board's judgement, the subject matter of claim 1 of the main request does not involve an inventive step within the meaning of Article 56 EPC.
4. *Inventive step - First auxiliary request*
- 4.1 Compared to the main request, claim 1 of the first auxiliary request further specifies a thermo electric cooler. This feature contributes to solving the second technical problem (II) of improving the cooling of the IR diode.
- 4.2 The technical problems (I) and (II) are mutually independent, thus allowing problem (I) to be treated

separately from problem (II) in the assessment of inventive step (see "Case Law of the Boards of Appeal of the EPO, 5th Edition", Chapter I.D.8.2.2).

- 4.3 As stated under item 3.5 above, the skilled person would consider the use of an aspherical lens to be an obvious choice for the light assembly of document D3.
- 4.4 As to the solution to problem (II), it is known in the art of solid-state light emitting devices to use thermo electric coolers (also known in the art as "Peltier elements") for improving the cooling of the light emitting devices. In particular, document D10 discloses a laser diode module incorporating a temperature controlling thermo electric cooler (see column 1, lines 20 to 25; Figures 1A and 1B). The skilled person faced with the problem of improving the cooling of an IR diode would thus consider using a thermo electric cooler for this purpose, as commercially available thermo electric coolers were specifically designed for this purpose. Furthermore, as shown in Figure 1B of document D10, the thermo electric cooler would preferably be located between the base and the IR diode.
- 4.5 For the above reasons, in the board's judgement, the subject matter of claim 1 of the first auxiliary request does not involve an inventive step within the meaning of Article 56 EPC.

5. *Inventive step - Second auxiliary request*

The respondent opponent submitted that claim 1 of the second auxiliary request contravened Article 123(2) EPC (see item X(e) above). For the reasons which follow, the board finds that notwithstanding the question whether or not the second auxiliary request complies with Article 123(2) EPC, it does not meet the requirement of inventive step (Articles 52(1) and 56 EPC).

5.1 Compared to the first auxiliary request, claim 1 of the second auxiliary request further specifies that the IR diode is connected to but electrically isolated from the base. In the light assembly of document D3, the IR diode is placed on the base, where the base 12 is in electrical contact with one of the electrical connection leads 13 of the package, so that the electric current path between the diode 11 and the electrical connection lead 13 passes through the base 12.

5.2 The respondent opponent argued that it was not evident how this feature would contribute to improving the thermal cooling of the light assembly. Since it was not clear that this feature would contribute to solving any technical problem, and that the appellant proprietor did not indicate any technical problem that this feature might contribute to solving, it should be disregarded in the assessment of inventive step (see item X(f) above).

5.3 The board finds, however, that the feature of having the IR diode electrically insulated from the base does

have tangible technical implications, namely that the housing is electrically insulated from the connection leads, in contrary to the light assembly of document D3 where the metal housing is held at the potential of one of the connection leads. Thus, this feature contributes to solving the technical problem (III) of insulating the (metal) casing from the connection leads.

It should be pointed out that the question whether the metal casing of a light assembly should be connected to one of the connection leads or isolated from both connection leads, depends on the type of application intended for the light assembly, and is also a matter dictated by the various civil and military standards for electronic devices.

The board is not able to see any technical interaction between the feature of having the IR diode electrically insulated from the base on one hand, and having an aspherical lens and a thermo electric cooler on the other hand. Thus, this feature can be treated separately in the assessment of inventive step.

- 5.4 As discussed under item 4 above, the skilled person would consider using an aspherical lens and of a thermal electric cooler for the light assembly of document D3.
- 5.5 The skilled person faced with the further problem (III) of modifying the light assembly of document D3 so that its metal casing is insulated from both connection leads would realise that this would be obtained by taking the measures of (i) insulating both connection

leads 13, 14 from the base, and (ii) insulating the diode from the base (see D3, Figure 2).

Measure (i) has to be considered obvious, since in the device of document D3, one of connection leads 14 is already insulated from the base (see Figure 2; column 2, lines 26 to 29).

As to measure (ii), insulating the IR diode from the base, this is already the case due to the presence of a thermo electric cooler: As mentioned under point 4.4 above, the most obvious position for the thermo electric cooler is between the IR diode and the base. The thermo electric cooler has to be electrically isolated from at least one of the IR diode and the base, since otherwise it would not be possible to conduct an electrical current through the cooling element which is necessary for its operation. This is illustrated in document D12 which discloses a light assembly comprising a laser diode 38 and a thermo electric cooler positioned between the laser diode and a base 20 (see Figure 2; column 2, lines 40 to 48). A diamond slab 33 placed between the laser diode 38 and the thermo electric cooler 65 functions as both an electrical insulator and a thermal conductor.

- 5.6 For the above reasons, in the board's judgement, the subject matter of claim 1 of the second auxiliary request does not involve an inventive step within the meaning of Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

Registrar:

Chair:

S. Sánchez Chiquero

T. Bokor