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) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 8 January 2003

Case Number: T 0832/00 - 3.4.2

Application Number: 94301275.7

Publication Number: 0644408

IPC: G01J 5/08

Language of the proceedings: EN

Title of invention:
Method and apparatus for measuring temperature using infrared techniques

Patentee:
OMEGA ENGINEERING, INC., et al

Opponent:
Raytek GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56, 114(2)

Keyword:
"Inventive step (confirmed)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0832/00

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 8 January 2003

Appellant: (Opponent)
Raytek GmbH
Blankenburger Strasse 135
D-13127 Berlin (DE)

Representative:
Tetzner, Volkmar
Anwaltskanzlei Dr. Tetzner
Van-Gogh-Strasse 3
D-81479 München (DE)

Respondent: (Proprietor of the patent)
OMEGA ENGINEERING, INC.
One Omega Place
Box 4047
Stamford, CT 06907 (US)

Representative:
Warren, Anthony Robert
BARREN & WARREN
18 South End
Kensington
London W8 5BU (GB)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 13 June 2000 rejecting the opposition filed against European patent No. 0 644 408 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: M. A. Rayner
B. J. Schachenmann

Summary of Facts and Submissions

I. The present appeal is against the decision of the opposition division to reject the opposition against European patent number 644 408 (application number 94 301 275.7). The patent concerns visibly outlining an energy zone to be measured by a radiometer.

II. *Independent Claims of the Patent*

The independent claims of the patent as granted were at issue both before the opposition division and the board of appeal. These claims have the following wording:

"1. A method for visibly outlining an energy zone to be measured by a radiometer, said method comprising the steps of providing said radiometer with a sighting device adapted to project a plurality of stationary light beams against a surface whose temperature is to be measured and adapted to outline said energy zone visibly;
characterised in that said sighting device is a laser sighting device including a primary laser beam generator (312;712) and a laser beam splitting device (312A, 312B; 715), and in that said method includes:

(a) generating a primary laser beam to strike said splitting device;
(b) dividing said primary laser beam, by means of said splitting device, into more than two secondary laser beams (314A, 314B; 714) and
(c) projecting said more than two secondary laser beams from said splitting device, said more than two secondary beams being directed to strike said surface (320) at separate positions about the periphery of said

zone so as to project a corresponding number of visible light spots (716) upon said surface (320) at the periphery of said zone, positioned so as to encompass and configure, and so visibly outline, said zone.

4. Apparatus for use in conjunction with a radiometer for visibly outlining an energy zone to be measured by said radiometer, said apparatus comprising a sighting device adapted to emit a plurality of stationary light beams against a surface whose temperature is to be measured and means to position said light beams about the energy zone to outline said energy zone visibly; characterised in that said sighting device comprises:
(a) a laser generator (312;712) operable to generate a primary laser beam;
(b) means comprising a laser beam splitting device (312A, 312B; 715) operable to divide said primary laser beam into more than two secondary laser beams (314A, 314B; 714) and to project said more than two secondary beams to strike said surface (320) at separate positions about the periphery of said zone, so as to position a corresponding number of visible light spots (716) upon said surface (320) at the periphery of said zone, to encompass and configure, and so visibly outline, said zone."

III. *Pertinent Documents in the Proceedings*

In the proceedings before the first instance reference was made *inter alia* to the following documents:

D1 DE-A-3 213 955

D2 JP-A-5 722 521 (with English translation)

D3 SU-A-1 827 553 (with English translation dated 11 November 2002 furnished by the Patentee)

During the appeal proceedings, reference was made further inter alia to:

D1/1 Delivery Note (Dr Specht)

D1/2 Purchase Order Dow Chemical

D1/3 Declaration of Bernd Herrmann

D3/1 Calculation relating to document D3

D3/2 Diagram of model

D5 Declaration of Volker Schmidt

IV. *Reasoning for Decision of the Opposition Division*

The opposition division was of the view that the skilled person would have had no incentive to modify the teaching of document D1 to use more than the two beams therein disclosed, even taking account of plural lamps as disclosed in document D2. Starting from document D2, if the skilled person recognised problems with heat and visibility of lamps, the most straightforward step would have been to implement a plurality of small laser diodes. The opposition division considered that while such might be the case, the teaching of outlining the energy zone could not definitely be deduced from document D3. The use of a diaphragm according to document D3 also speaks against replacing a light bulb by a laser.

The opposition division decided pursuant to Article 114(2) EPC to disregard the opposition so far as pertaining to Article 100(b) EPC as this ground was filed after expiration of the period for opposition. In support of its position, the opposition division explained that the skilled person would have no

difficulty in constructing an optical device splitting a laser beam into more than two beams given the teaching of the description of the patent as to the desired resulting configuration. In relation to the embodiment of Figure 4, the skilled person is considered able to choose the fibre which suits his purpose best.

V. *Appeal Procedure*

A notice of appeal and a statement of setting out grounds therefor were filed and the views of the parties were exchanged in writing. Oral proceedings were requested on an auxiliary basis by both parties and were appointed consequent to these requests. In its communication annexed to the summons to these oral proceedings, the board observed that the cases of the parties appeared to be becoming focussed on the issue of inventive step in relation to documents D1 to D3.

Part of the presentation of the appellant (opponent) during the oral proceedings involved a model being demonstrated. The board permitted the demonstration to proceed, giving the respondent time to examine the model during a break.

The board gave its decision at the end of the oral proceedings.

VI. *Summary of Case of the appellant*

Requests

Revocation of the patent

Submissions

Document D1

At the time of document D1, only gas lasers were available, such as a He/Ne laser with a red output and needing more than 1 W input for 1 mW output. Two split beams produced by the miniature laser chosen for the device thus had less than 1/2 mW output per beam.

According to document D1, diameter of an energy zone is determined by the distance between diametrically opposed circumferential spots. There are two embodiments mentioned, in the first case the measured zone becomes smaller then larger with distance and in the second afocal case (second paragraph, page 6), which is important in the present case, the zone becomes larger with increasing distance. The skilled person sees the circle around the zone in his mind's eye based on the distance between the spots, if necessary rotating the device so that a further diameter is shown.

In practice, it turned out that customers for the device of document D1 were interested in a device with more than two beams as is illustrated by document D1/3. Nevertheless, it turned out, that in view of application in factory halls and so on, that two beams with full available illumination performance were preferred to a plurality of weaker beams, as the device could be rotated as necessary for outlining as aforesaid. Had more split beams been produced, rearrangement of the optical train for different sensors would not have been difficult in view of the development of ultraviolet glues, which can simply be hardened with a pistol.

At all events, compared with document D1 the problem addressed by the patent in issue is to render the energy zone even more clear. The solution of providing more light spots urges itself on the skilled person, who only needs to repeat exactly the same splitter

arrangement as already present in the disclosure of document D1 to split a beam a second time. The mobility and weight of the device would hardly be changed thereby.

Moreover, document D5 shows that in the organisation of the appellant multibeam devices had been discussed and developed. Naturally when cheaper lasers became available, the appellant itself posed the question of what could be done with them, but as bright spots were known, simply doubling them, while feasible, did not seem to the appellant to be worthy of a patent. Thus multibeam devices, by which modifying the optical train and not simply using two laser and doubling the optical train was meant, had not been considered worthy of a patent until an application for a device with a diffractive element was filed in 1995. A two beam device continued to be provided for a mass market at the patent application date does not speak against a multibeam device being provided for a more specialist market. In general, the development in the number of the outlining spots can be considered similar to airbags in a road vehicle, first two, then three and so on, no invention being necessary for this.

It must therefore be concluded that the subject matter of the independent claims is obvious in the light of the teaching of document D1.

Document D2

According to document D2, a plurality of beams are directed onto a surface being measured, these beams being directed to the outer periphery of the zone the temperature of which is being measured. Since the beams impinge on the surface outside the measuring zone they do not cause an error by contributing to increase of measured temperature. Thus the only difference in the

patent is the kind of illumination source, which is obvious. Moreover, obviousness in the light of the teaching of closest prior art document D1 is even more apparent in the light of the further teaching of document D2 entailing the pointer towards a plurality of light sources.

It must therefore be concluded that the subject matter of the independent claims is obvious in the light of the teaching of document D2, or document D1 in the light of document D2.

Document D3

Document D3 offers a further starting point for consideration of inventive step.

The K-spot of the disclosed device is analogous to the energy zone of the patent in dispute. The position of the opposition division relating to definition of the energy zone according to page 11, second paragraph, of the decision is incomprehensible as according to document D3 the energy zone is characterised as closely as possible without overlap. The diaphragm with holes 8' for outlining the energy zone as disclosed is only the simplest possibility for doing this. The use in relation to eye surgery is not important as the detector is of a sort able to measure temperature.

According to the second paragraph on page 2 of the translation of document D3, additional energy is a disadvantage and a more accurate measurement is provided. The difference in the patent is the light source, whereby an incandescent light is only an example in document D3. Thus the objective problem in 1993 was to provide a higher performance light source, whereby a laser had nothing but advantages, in view of, for example, an incandescent light having low energy

efficiency and generating superfluous energy thus requiring a heat sink. The device operates at a specific distance, but the question of distance from the surface to be measured is left open in the claims of the patent in issue, so this issue is not relevant.

The model demonstrated has a diaphragm and is presented to illustrate illumination with a laser diode in a configuration like that of document D3.

The embodiment of the patent pertaining to light fibres amounts to a diaphragm just as in document D3. This is because the bunch of fibres does not fill the input face and the gaps between the fibres can be considered a diaphragm. A comparable concept is sunlight striking the blind on a room window. The term splitting must therefor be read broadly to include 50/50 or 60/40.

Moreover, the optical fibres embodiment according to Figure 4 of the patent in issue is not practicable as divergent rays emerge from the fibres which are not suitable for generating a spot of light. A consequently necessary measure is the provision of a collimating lens at the fibre end, which is not disclosed and even then directing the beam is scarcely possible. So far as column 4, lines 29 to 20 can be seen as a sufficient disclosure, the teaching of the patent is restricted to the use of beam splitters and mirrors.

It must therefore be concluded that the subject matter of the independent claims so far as sufficiently disclosed is also obvious in the light of the teaching of document D3.

VII *Summary of Case of the respondent*

Requests

Dismissal of the appeal.
Refusal to permit presentation of the model.
Disregarding, in view of their irrelevance, of the documents filed during the appeal proceedings.

Submissions

The problem addressed by the patent is that of improving accuracy of measurement, jumping to outlining as done by the opponent already involves part of the solution.

Document D1

The disclosure of document D1 is very explicit in that the one laser beam of laser 4 is split into two secondary beams, not more and not less. It would not be feasible to further split the two laser beams, since this would make the adjustment process of the mirror arrangement for different detectors very complicated, thus going against the object of providing a small and lightweight sighting device. Moreover, the wording of claim 1 requires that a primary laser beam is split into more than two secondary laser beams, not that a secondary beam is further split according to the conjecture of the appellant relating to placing a further splitter in an already split beam. It must also be underlined that since the energy zone was visualised in the mind's eye, there was no need to increase the number of beams provided according to the teaching of document D1. There would moreover have been more than just one laser available at the time of document D1. There is no suggestion that documents D1/1 to D1/3 or D5 are prior art and the declaration of

Bernd Hermann reinforces the idea there was a prejudice against modifying the device of document D1 to display a second dimension of the measurement field.

Document D2

The light of the sighting device of document D2 can only be seen in dark environments, has a bulky construction and involves difficult alignment.

Accordingly, both document D1 and document D2 fail to characterise accurately the position and outline of a measurement spot of a remote thermometer with a small device in both dark and light surroundings.

Document D3

The guidance means known from document D3 is for one specific distance and is not a sighting device within the meaning of the patent and would furthermore be useless with a laser source instead of the lamp. A diaphragm is specific to an incandescent lamp, there is no reason to provide an inferior version with a laser. There is also a natural aversion to masking laser output using a diaphragm as most light is blocked wasting power. The appellants model seems to block off 90% and is an example of reverse engineering with hindsight using knowledge of the invention. The light source is used very close to the eye in eye surgery and this permits use of the masking action of the diaphragm.

Therefore, it must be concluded that novelty and inventive step are provided by the subject matter of all versions of the claims.

Any attempt of the appellant to introduce sufficiency into the appeal proceedings cannot be successful as the skilled person reading the contested patent would have understood that beam splitting can be achieved by various means.

Reasons for the Decision

1. *Admissibility of the appeal*

The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Article 114(2) EPC*

2.1 *Model demonstrated during oral proceedings*

The model was not alleged to be prior art, but was understood by the board to be for illustrating the argument of the appellant, much in the same way as illustration with coloured pens on the flip chart as often used by parties in oral proceedings at the EPO. The board permitted the model to be demonstrated as it was not very complex in relation to its germane feature of the diaphragm in the optical path and the board considered it could be expected to be understood both by the board and the other party without postponement of the proceedings, i.e. it could be understood within the timeframe of the oral proceedings. The explanation D3/1 relating to document D3 and the schematic diagram of the model filed ahead of the oral proceedings could also be understood without delaying reaching of a decision at the oral proceedings and so were admitted.

2.2 *Documents filed during the appeal proceedings*

The board furthermore reached the view that the level of complexity of statements of Bernd Hermann (D1/3) and Volker Schmidt (D5) as well as documents D1/1 and D1/2 permitted them to be dealt with in the timeframe of the appeal proceedings without unfairness to the respondent.

Relevance of model and documents filed during appeal

2.3 Since the board considers the complexity of facts or evidence filed in the context of the timeframe of the appeal proceedings to be a more pertinent than consideration of relevance thereof, which consideration in any case entails analysis of the items concerned, the board did not comply with the respondent's request to disregard them.

3. *Amendments*

Inadmissible amendment was not a ground of opposition nor have any amendments been made by the patentee during the opposition or appeal proceedings. Accordingly, issues pertaining to Article 100(c) (Article 123) EPC are not taken up the present decision.

4. *Sufficiency* (Article 100(b) EPC)

While sufficiency of embodiments using beam splitters and mirrors was not explicitly challenged (see penultimate paragraph of section VI of the Facts and Submissions above), the appellant continued to allege insufficiency of disclosure of optical fibres used in the context of splitting the primary beam into more than two secondary laser beams. This allegation does not form a convincing basis either for countering the

contraposition of the respondent that the skilled person knows how to implement splitting with various components including optical fibres or for calling into question the assessment of the opposition division in relation to insufficiency in the context of use of optical fibres. Therefore, the board saw no reason in the case presented for overturning the decision of the opposition division in relation to Article 100(b) EPC. Accordingly, the case of the respondent is successful in this respect.

5. *Prior Art*

Pertinent disclosures in prior art documents in the proceedings are as follows:

5.1 *Document D1*

This document concerns mainly battery driven radiation thermometers for portable use. The problem of recognising the position and size of a zone the temperature of which is being measured is mentioned. The device is aimed at being able to accommodate differing sensors with only minor adjustment. In the specific embodiment, a He-Ne laser beam is reflected by a mirror 7 to a beam splitter 8. The beam 13' deflected by the splitter takes a path laterally of the sensor and through beam optics to exit the device. The beam passing through the splitter is deflected by a mirror 7' and takes a path on the other side of the sensor and through beam optics to exit the device. The emerging two split beams diverge and the angle of divergence is made sensor specific by rotating the splitter 8, the mirrors 7 and 7'. The two beam spots define the diameter of the zone of which the temperature is being measured by the sensor. The opto-mechanical components are arranged in an "H" formed holder 11, preferably of Aluminium, with rubber

mountings to an external housing 10. The holder 11 provides electrical screening and heat sinking. A pistol grip is envisaged.

5.2 *Document D2*

This document discloses a detector 1 detecting IR radiation from an area 2a of an object 2. A visible light source 5 such as a lamp or multiple light sources are located so as to illuminate close to the outer zone of the IR area 2a. Multiple visible light rays are set parallel along the outside of the invisible IR radiation to be detected.

5.3 *Document D3*

This document discloses a laser radiation dosimeter to determine and monitor level of exposure of human organs to radiation, for example the exposure of visual organs when surgical operations are being performed and patients are being treated with laser equipment. The dosimeter has a measurement channel 1 with an input lens and a radiation sensor 3. A focussing channel 4 comprises a source of visible radiation 7, for which an incandescent lamp may be used, a diaphragm 6 and output lens 5. The diaphragm has one or more openings 8(8'), which cause one or more reference points (spots of light) to be created on the exposed specimen. A change of position of the dosimeter causes the reference point, if there is just one, or the centre of their arrangement, if there are more than one, to coincide with a monitoring point 11 exposed to radiation and causes them to become focussed. At the same time, the optical axes of the measurement channel and the focussing channel are automatically brought together at the monitoring point 11. When the openings in the diaphragm are positioned away from the centre, the luminous radiation from the focussing channel which is

reflected from the exposed specimen does not enter the measurement channel and does not affect the result. The minimum distance required between the lower edge of the diaphragm openings and the centre of the diaphragm, at which distance the stream of light from the focussing channel does not enter the measurement channel is determined.

6. *Novelty - Main Request*

6.1 Document D1 does not disclose more than two secondary laser beams. Documents D2 and D3 do not employ a laser device and consequently no laser beam is split.

In view of the foregoing, novelty over the disclosures of documents D1, D2 or D3 can be considered present in the subject matter of the independent claims. Novelty was not in dispute between the parties. No other available prior art document comes closer to the subject matter of the claims. Accordingly, the board is satisfied that novelty within the meaning of Article 54 EPC is present in the subject matter of independent claims 1 and 4.

7. *Inventive Step*

Document D1

7.1 Since, according to the second paragraph on page 3 of document D1, the problem addressed is making the path of the infrared measuring beam recognisable to the user and the particular device disclosed uses two laser beams to define position and diameter of an infrared measuring zone, the board considers this document to

represent the closest prior art. The board therefore does not consider that the problem addressed is improving accuracy "in general" as alleged by the respondent but that it is that of improving accuracy of the measured zone.

As explained by the appellant, laser diodes became available by the date of application of the patent. In agreement with the appellant, the board considers that the skilled person would have considered using such a diode in place of the gas laser described in document D1 as this fits in both with general development and the making of a brighter yet lighter portable device. However, also according to the appellant, the area of the zone measured by the device of document D1 was determined in the mind's eye of the user based on the diameter indicated by the laser spot spacings, augmented as necessary by rotating the device to show a different diameter. This would naturally be facilitated using the lighter diode. However, based solely on laser diode development, the skilled person would have had no reason to move away from the seemingly satisfactory two beam construction. Therefore the board concludes that use of a laser diode in place of the He-Ne laser would have improved the device while staying consistent with the interchangeability and other desiderata expressed in document D1, but would not have led to a device any closer to the wording of the independent claims of the patent in dispute.

The appellant took, with reference to documents D1/3 and D5, the line that the two beam approach was never really the optimum solution for the skilled person, who all along really would have preferred multiple beams but at the time of document D1 was foiled in his wish for a further pair of orthogonally disposed beams purely by the performance limitations of gas lasers, i.e. the output was too weak to provide four strong

enough beams. In the board's view, it is possible to interpret documents D1/3 and D5 either way so that further consideration thereof is cumbersome and may not lead to a conclusive result in interpretation of document D1. Moreover, since neither documents is prior art and both are hardly independent of the appellant, the board is not convinced that their use to interpret document D1 is even proper. Nevertheless, in order to short circuit this issue, the board will assume for the sake of argument, that the skilled person could have had multiple beams "in mind". The view of the board would then be that the skilled person would, based on document D1, either have simply duplicated the entire existing system using two light laser diodes or even more simply used four diodes. Neither of these possibilities leads to the claimed subject matter as in neither case is a primary laser beam split into more than two secondary beams. The appellant did not argue for either of these solutions, but instead advanced a construction where the optical train of the splitter and one mirror alone was duplicated and then applied to just one of the secondary beams to split it further. However, as pointed out by the respondent, even this arrangement according to the strongest case of the appellant does not meet the wording of the claim because the primary beam is not then split into more than two secondary beams, but two secondary beams, one (or both) of which is (are) further split. However, even aside from this defect, document D1 is directed to an arrangement where the detector can be changed, entailing adjustment of the laser optics. There can be no doubt in the board's view that adjusting a complicated optical train as proposed by the appellant, even if readily set optical glues were available, runs, much more than straight duplication or even a laser per

beam, counter to the design parameters of a simply portable device as desired according to the teaching of document D1. For this reason, the board considers that only hindsight with knowledge of the invention could suggest the structure postulated by the appellant, which even then would not meet the claim wording.

Therefore the line of argument of the appellant based on document D1 alone and the knowledge of the skilled person failed to convince the board as to lack of inventive step.

7.2 *Document D3*

The board doubts whether document D3 represents the closest prior art as a particular interest therein is in relation to eye surgery rather than remote temperature determination. Nevertheless, in view of the strong representations by the appellant in the direction of it being an appropriate starting point, the board will contemplate this possibility.

In the view of the appellant, the problem solved by the patent in relation to document D3 is simply to provide a better light source. While the board agrees, contrary to the opposition division, that an analogue to the energy zone of the patent is provided by the outer ring of apertures 8' according to document D3, the approach of the appellant overlooks the significance of the fact that document D3 does not provide any beam splitter at all, the diaphragm disclosed in document D3 not being a beam splitter. Therefore, even if the line of the appellant were followed by the board and it were assumed that the incandescent lamp used according to document D3 were replaced by laser diodes, the subject matter claimed in the patent would not be reached. An efficient use of light, i. e. maximum light for the minimum power in the outlining function, is important

for radiometers of the type at issue in the present case and the board considers it unrealistic to believe the skilled person would have used a diaphragm and blocked off the light. The diaphragm in the model demonstrated during the oral proceedings illustrated this to the board.

The appellant addressed this flaw in his argument by seeing the embodiment described in the patent and using optical fibres as more like a diaphragm than a beam splitter. This line or argument, including also a reference to window blinds, is directed to promoting the diaphragm up to being a beam splitter via other items such as optical fibres or window blinds. However, the fact is that a beam splitter remains a beam splitter, optical fibres remain optical fibres and a diaphragm remains a diaphragm. The skilled person knows from the patent in issue that the laser beam is split by the optical fibres and this is not what is done by the diaphragm of document D3. Thus this line of argument failed to convince the board.

Therefore the line of argument of the appellant based on document D3 alone and the knowledge of the skilled person failed to convince the board as to lack of inventive step.

7.3 *Document D2*

There is no suggestion towards using a laser and splitter in this document. The skilled person could have done several things with the light source involving mirrors, diaphragms or other optical components. The skilled person could have looked at document D1, but if so could have preferred the entire setup there. There is no reason in accordance with established jurisprudence for concocting the arrangement claimed in the independent claims. In the

reverse direction starting from document D1, the use of a possibility of multiple sources in whatever configuration from document D2 would again need to be weighed with the simple two beam setup. Apart from the choice of lasers, laser diodes or incandescent lights, the complex of issues relating to the "one primary to more than two secondary laser beams" as has already been considered in section 7.1 above, is also not resolved. Thus only hindsight considerations could make document D2 seem relevant. Accordingly, lines of argument involving document D2 alone or in combination with document D1 also failed to convince the board as to lack of inventive step.

Airbag argument

7.4 The argument that producing more beams is a natural development with time like providing more airbags in a car is related to a different technical field and the board does not consider it relevant to radiometers with multiple laser beams. The board does however observe that on the face of it even the concept is different as it would seem that plural airbags are provided and not that one airbag is split. Thus this general argument also failed to convince the board as to lack of inventive step.

Summary

7.5 Therefore, the lines of argument advanced by the appellant failed to convince the board that the independent claims are directed to subject matter which cannot be considered to involve an inventive step according to Article 56 EPC.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini