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D E C I S I O N
of 17 December 2004

Case Number: T 0465/03 - 3.4.2

Application Number: 96112995.4

Publication Number: 0759538

IPC: G01C 15/00

Language of the proceedings: EN

Title of invention:
Laser system for surveying

Applicant:
KABUSHIKI KAISHA TOPCON

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - main and auxiliary request 1 (no)"
"Remittal for further examination of auxiliary request 2"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0465/03 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 17 December 2004

Appellant: KABUSHIKI KAISHA TOPCON
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 7 August 2002 refusing European application No. 96112995.4 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: M. A. Rayner
J. H. P. Willems

Summary of Facts and Submissions

I. The patent applicant has appealed against the decision of the examining division refusing European patent application number 96 112 995.4, which refers to a theodolite with a laser system. The examining division was of the opinion that the subject matter of independent claim 1 as presented to it could not be considered to involve an inventive step.

II. During the examination procedure, the examination division had observed (see point 3.1 of the communication dated 5 October 2001), that in the embodiment illustrated in Figures 3 and 4 of the application, an optical fibre guides laser light from a laser light emitting unit to an optical resonator with no further optical fibre provided from the resonator to the optical system. The division objected that there was a contradiction with the independent claim before it and thus a lack of clarity in the sense of Article 84 EPC. The applicant cancelled Figures 3 and 4 and associated description with its letter of 15 April 2002.

III. The decision under appeal makes reference to the following documents:

D1: US-A-5 022 043

D2: US-A-4 763 975

D3: EP-A-0 015 575

D4: Technische Rundschau, vol. 63, no. 24; 4 June 1971, Bern, Page 43 - "Lasertheodolit"

D5: DE-A-4 041 130

In its decision, the division considered the subject matter of independent claim 1 before it to differ from the device disclosed in document D4 by virtue of a laser diode pumped solid state laser comprising a light emitting unit and an optical resonator. These novel features could be considered to render the device more compact, but as this is a permanent objective in the art, addressing this problem could not be considered to involve an inventive step. Documents D1 and D2 are mentioned as showing the novel features to be known and the division reached the conclusion that replacing the gas laser of document D4 leads to the claimed subject matter without involving an inventive step. It is also obvious that the heat of the laser light source used in document D4 is radiated via its casing. Use of a high heat conductivity casing and providing an electronic freezing element does not involve an inventive step.

IV. The appellant requests that the decision under appeal be set aside and that a patent be granted. Oral proceedings were requested on an auxiliary basis and, in consequence, appointed by the board.

V. In a communication accompanying the summons to oral proceedings, the board expressed its view that replacing a gas laser by a solid state arrangement is commonplace. The board also remarked that it is difficult to see how heat can be radiated in a way excluding casing. One is entitled to assume that heat

is not 100% trapped in, for example, the teaching of document D3, where a laser unit and optical system are in the same casing. Generally speaking, unless one assumes that the heat sinks and solid state lasers shown in the other prior art documents must be uncased, they will also discharge some heat through casing. It thus seemed unlikely that an inventive step can be involved in such subject matter.

VI. The basis upon which the appellant has requested grant of a patent is a main request (filed with the letter dated 8 November 2004) or one of six auxiliary requests (auxiliary requests 1 to 4 being filed with the letter of 8 November 2004 and auxiliary requests 5 and 6 during oral proceedings before the board of appeal).

VII. The wording of the independent claim upon which the main and first and second auxiliary request is based is as follows:

(a) Main request

"1. A laser system for surveying comprising
a laser light source unit (20), an optical system (1) for irradiating a laser beam toward a given direction and an optical fibre (22) for guiding the laser beam toward the optical system (1),
wherein said optical fibre (22) guides the laser beam from said laser light source unit (20) toward said optical system (1) so that said laser light source unit (20) is thermally isolated from said optical system (1) characterized by

that said laser light source unit (20) is an LD pumped solid-state laser comprising a nonlinear optical medium for second harmonic generation,
that said laser light source unit (20), said optical system (1) and said optical fibre (22) are arranged in a casing (4) and
that said laser light source unit (20) is fixed on said casing (4) via a heat sink or an electronic freezing element and radiates heat via said casing (4) whereby a portion of said casing (4) on which said laser light source unit (20) is fixed consists of high thermal conductive material."

(b) Auxiliary request 1

"A theodolite with a laser system for surveying comprising
a laser light source unit (20), an optical system (1) for irradiating a laser beam toward a given direction, and an optical fiber (22) for guiding the laser beam toward the optical system (1), wherein said optical fiber (22) guides the laser beam from said laser light source unit (20) toward said optical system (1) so that said laser light source unit (20) is thermally isolated from said optical system (1), said theodolite further comprising a telescope (41) with an objective lens (40) whereby the laser beam transmits said objective lens (40)
characterized by
that said laser light source unit (20) is an LD pumped solid-state laser comprising a nonlinear optical medium for second harmonic generation,

that said laser light source unit (20), said op system (1) and said optical fiber (22) are arranged in a casing (4) and
that said laser light source unit (20) is fixed on said casing (4) via a heat sink or an electronic freezing element and radiates heat via said casing (4) whereby a portion of said casing (4) on which said laser light source unit (20) is fixed consists of high thermal conductive material."

(c) Auxiliary request 2

"1. A theodolite with a laser system for surveying comprising
a laser light source unit (20) and an optical system (1) for irradiating a parallel laser beam toward a given direction, said theodolite further comprising a telescope (41) with an objective lens (40) whereby the laser beam transmits said objective lens (40) characterized by
that the laser light source unit (20) is an LD pumped solid-state laser comprising a nonlinear optical medium (14) for second harmonic generation, a light emitting unit (8) and an optical resonator (9), whereby the said optical resonator (1) is provided in the optical system and the light emitting unit (8) and the optical resonator (9) are connected via an optical fiber (22)."

(d) Auxiliary Requests 3 to 6

The wording of the independent claims of these requests is not given as it is not dealt with in this decision (see section 4.2 of the Reasons below).

VIII. The arguments of the appellant in support of substantive patentability can be summarised as follows.

Novelty is not in dispute, but the differences between the claimed subject matter and prior art needs to be identified. Thus, document D1 relates to a high power laser system with an optical fibre positioned differently as it is not guiding the laser beam from the laser light source towards the optical system as in claim 1, nor are laser, fibre and optics in the same casing. In document D2 there is no frequency doubler, the beam is invisible and the system is not in a casing. In document D3 there is neither a solid state source nor a heat sink, vibration protecting foamed material, i.e. a heat insulator, is shown between the laser and the casing. In document D4 there is no laser diode pumped solid state laser nor a housing as claimed. In document D5 there is no fibre, nor is there a housing.

The closest document is document D4, which is not arranged so that the optical system is in the casing via which heat from the gas laser is radiated. As document D3 shows a compact laser measuring system, where in use the heat dissipation seems to reach a steady state, there is no reason to provide further cooling, a combination of documents D4 and D3 thus providing a compact surveying system without any further change being necessary. Document D1 relates to a high power laser, which cannot be used in surveying for fear of injury to workers. Therefore the laser system disclosed would not have been considered relevant by the skilled person. In documents D2, producing a beam comparable to a 1 to 10 mW helium-neon laser is mentioned, the power thus being also high and

suggesting to the skilled person to use a solid state laser of such power. Moreover the lasing media specified produce light which is not visible, there being no second harmonic generation. An invisible beam is useless in surveying and thus the skilled person would also have dismissed the disclosure of document D2 as irrelevant. Document D5 discloses a liquid cooled heat sink for the laser diode and relates to a laser diode pumped solid state laser, which could be used in the field of measurement technology. While it must be acknowledged that the laser according to document D5 could at least theoretically be used in a laser theodolite as shown in document D4, it is very sensitive and thus unsuitable for use in a building site type environment, only the embodiments in Figures 2b and 5 emitting visible light - cheaper lasers would have been preferred by the skilled person. This teaching would therefore not have been considered relevant by the skilled person, and even had it have been, the laser would only have replaced the gas laser of document D4 and not been in a common casing with the optical system. If it is necessary to combine more than two documents in a line of argument against inventive step, this is an indication that a inventive step is present.

IX. With respect to the subject matter of auxiliary request 1, a laser theodolite is disclosed only in document D4, no optical system for a theodolite being disclosed in documents D1, D2 and D5 and document D3 showing a different use. Combinations of the teaching of document D4 with that of the other documents in an obvious way is therefore even less likely.

X. Auxiliary request 2 relates to subject matter as disclosed in Figures 3 and 4 of the application as filed.

XI. At the end of the oral proceedings, the board gave its decision.

Reasons for the Decision

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

2. *Main Request*

2.1 Novelty is not at issue and in the view of the board, the closest prior art is constituted by document D4, as it relates to a theodolite. This position is shared by the appellant and is reflected in the two part form of claim presented, the novel features thus being those of the characterising part of claim 1. The novel features of the claim can be considered to relate to making the system more compact.

2.2 Since document D3 discloses a complete laser feeding an optical fibre leading to an optical system, all of these items being in a casing and the system disclosed relating to aligning long objects, such as pipes, the board considers the incorporation of the items mentioned into a casing to be obvious for the theodolite of document D4 in the closely related field of surveying. The board sees the line of argument presented by the appellant along the lines of accepting

that this combination would have provided a compacter system as confirmation of its view.

2.3 The board concurs with the view of the examining division that using a laser diode pumped solid state laser in place of a gas laser provides a more compact system, which the skilled person considers a permanent desideratum for a surveying instrument. Therefore, the board's view is that replacing the lasers shown in document D4 or D3 with a more compact laser arrangement which became available before the priority date of the patent application was commonplace and an obvious step. Documents D1, D2 and D5 disclose some examples of pumped lasers, including frequency doubling (for example Figure 4 of document D1 or Figures 2b and 5 of document D5). In making the choice of compacter solid state laser, it is plain to the board, that with the surveying field as starting point, the skilled person would not have selected a laser with an invisible beam. By the same token, as the skilled person concerned with surveying equipment was well aware of statutory power requirements, the board does not share the view of the appellant that the power level in say the disclosure of documents D1 and D2 would have ruled out any use of pumped lasers. As the appellant acknowledged, the laser disclosed in document D5 is, in any case, suitable in principle. It is a matter of routine to provide a secure mounting. Thus the board concluded the skilled person would simply have chosen the appropriate power level, it being, in the view of the board, rather unrealistic to believe, as the approach of the appellant implies, that the skilled person would have been restricted just to gas lasers of the appropriate power in the field of surveying. Whether or not there

were cheaper choices of laser than gas lasers or that claimed may play a commercial role, but in the present case this aspect does not bear on the obvious choice of a visible laser of suitable power.

2.4 Another other issue in dispute is that of laser cooling, which can be considered a well recognised feature of pumped solid state lasers and is not specific to surveying apparatus. All of the prior art documents disclosing a pumped laser deal with provision for cooling (see document D1, Figure 2 - heat sink; document D2, Figure 1, heat sinks 39, 40 and 41; and document D5, column 2, line 13 - cooling channels 20). There is thus no reason for the skilled person to believe that when replacing the gas laser disclosed in document D4 with a laser diode pumped solid state laser, such a heat sink is unnecessary. Heat is moreover always radiated from a casing carrying laser and heat sink, a usual metal casing being obviously highly conductive. Whether or not means for preventing mechanical shock to the laser is also present is a side issue irrelevant to the necessity of providing cooling.

2.5 The reason for the number of documents mentioned in relation to inventive step is, starting from document D4, that more than one matter relating to providing a compact system is considered in the claim, i.e. the casing and the LD pumped solid state laser comprising a nonlinear optical medium for second harmonic generation with laser concomitant laser cooling. Only document D3 or one of the other documents were considered in reaching the view that a respective one of these matters was obvious. Therefore, the line of argument

relating to the number of documents failed to persuade the board as to inventive step.

2.6 In view of the foregoing, the board was not persuaded by any of the appellant's arguments and thus had to conclude that it was obvious for the skilled person to provide the laser system claimed in claim 1 board. Accordingly, this subject matter cannot be considered to involve an inventive step in the sense of Article 56 EPC.

3. *Auxiliary Request 1*

The difference between claim 1 of this request and that of the main request is that the claim is directed to a theodolite with a telescope and objective lens rather than a system for surveying. Since document D4 shows a theodolite, this difference has already been dealt with in the assessment of the main request. Therefore, no inventive step is introduced to the subject matter claimed by this difference. Accordingly, the board was not convinced as to inventive step within the meaning of Article 56 EPC of the subject matter of claim 1 of auxiliary request 1.

4. *Auxiliary request 2*

4.1 There are some linguistic mistakes in the claims, for example "whereby the laser beam transmits said objective lens" or "characterized by that". However, claim 1 of this request provides a theodolite where, amongst other things, the optical resonator is provided in the optical system and the light emitting unit and the optical resonator are connected via an optical

fibre. The appellant has pointed out, correctly, that this subject matter is related to the disclosure of Figures 3 and 4 of the application. Since the subject matter concerned has not been dealt with in the context of decision of the first instance (as it had been cancelled - see section II of the Facts and Submissions above), the board considers it appropriate, in fairness to the appellant so as to avoid a possible loss of instance, to remit the claim back to the first instance, to continue examination of the case. In continuing the examination, the examining division is, of course, free to consider all aspects of the European Patent Convention, with the exception of inventive step of higher order requests with the wording given and already decided upon in the present decision.

4.2 As the board was not in a position to decide on the second auxiliary request, it could not proceed to consider the lower order requests 3 to 6.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first for further prosecution on the basis of auxiliary request 2 as filed with the letter of 8 November 2004.

The Registrar The Chairman:

P. Martorana A. G. Klein