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**Datasheet for the decision
of 10 November 2016**

Case Number: T 0936/14 - 3.2.08

Application Number: 03701588.0

Publication Number: 1469969

IPC: B23K26/06, G01B3/00

Language of the proceedings: EN

Title of invention:

LASER MARKING

Patent Proprietor:

Renishaw plc

Opponent:

Dr. Johannes Heidenhain GmbH

Headword:

Relevant legal provisions:

EPC Art. 56, 84, 123(2)

RPBA Art. 12(4), 13(1), 13(3)

Keyword:

Inventive step
Late-filed request
Late-filed argument

Decisions cited:

Catchword:



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Case Number: T 0936/14 - 3.2.08

D E C I S I O N
of Technical Board of Appeal 3.2.08
of 10 November 2016

Appellant: Dr. Johannes Heidenhain GmbH
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 3 April 2014 rejecting the opposition filed against European patent No. 1469969 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman I. Beckedorf
Members: M. Alvazzi Delfrate
M. Foulger

Summary of Facts and Submissions

- I. With the decision sent on 3 April 2014 the opposition division rejected the opposition against the European patent No. 1 469 969.
- II. The appellant (opponent) lodged an appeal against that decision in the prescribed form and within the prescribed time limit.
- III. Oral proceedings before the Board of Appeal were held on 10 November 2016. For the course of the oral proceedings, the issues discussed with the parties and the parties' final requests, reference is made to the minutes of the oral proceedings.
- IV. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of one of auxiliary requests 1 to 3 filed with letter of 10 December 2014.

- V. Claim 1 of the **main request** (patent as granted) reads as follows:

"A method of producing precision marks (28) for a metrological scale, employing apparatus including: a scale substrate (10) to be marked at repeated instants by a laser (21) and thereby forming a metrological scale; a laser (21) operable so as to provide light pulses for forming scale markings at the substrate; a displacement device (100) for causing relative displacement between the substrate (10) and the location at which the light is incident on the

substrate (10); and a controller (200) for controlling the relative displacement and the laser (21), the method comprising the steps, in any suitable order, of:

operating the displacement mechanism (100) so as to cause relative displacement between the substrate (10) and the light;

using the controller (200) to control the relative displacement and to operate the laser (21) so as to produce light pulses at the substrate (10);

characterised in that:

the laser (21) produces a plurality of ultra-short output pulses of a fluence at the substrate such that the metrological scale marks are formed by laser ablation, each of said plurality of ultra-short output pulses having a pulse length of less than four picoseconds."

Claim 1 of **auxiliary request 1** differs from claim 1 of the main request by the additional feature according to which:

"the scale substrate is metallic".

Auxiliary requests 2 and 3 are not relevant for the present decision.

VI. The following documents played a role for the present decision:

D1: EP -B- 0 048 487; and

D3: Liu, X. et al., "Laser Ablation and Micromachining with Ultrashort Laser Pulses" IEEE JOURNAL OF QUANTUM ELECTRONICS, Vol. 33, No. 10, October 1997.

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

Main request - inventive step

D1 represented the closest prior art. It disclosed a method according to the preamble of claim 1. Additionally, in the method of D1 the laser produced a plurality of pulses of a fluence at the substrate such that the metrological scale marks were formed by laser ablation. The difference of the claimed method in respect of the conventional long pulse laser of D1 was that ultra-short pulses were used. Its effect was to improve the precision of the markings. Hence, the problem solved starting from D1 was to provide a method with an improved accuracy of the scale to be obtained by laser ablation. The person skilled in the art, who was already familiar from D1 with the use of lasers in this context, would have consulted documents dealing with laser, such as D3. D3 taught that improved precision was possible by the use of ultra-short pulses. There was no problem in implementing the laser of D3 in the system of D1. Hence, D1 and D3 rendered the method of claim 1 of the main request obvious.

Admission into the proceedings of auxiliary request 1

Auxiliary request 1 should not to be admitted into the proceedings because it could have been submitted in the opposition proceedings. Moreover, since it comprised features from the description, it represented a fresh case in respect of the case considered by the opposition division.

Articles 123(2) and 84 EPC objections in respect of auxiliary request 1

In any event, auxiliary request 1 was objectionable under Article 123(2) EPC because the application as originally filed did not comprise the wording "metallic substrate". Furthermore, this wording was not clear because it was not specified what was a substrate in the sense of the invention. These objections were raised late because the request itself was late-filed.

Auxiliary request 1 - inventive step

In the process of D1, a glass carrier coated by a nickel layer was used to produce the metrological scale. The nickel layer could be regarded as the substrate of the claimed invention. Hence, D1 also disclosed a metallic substrate. Therefore, the subject-matter of claim 1 of auxiliary request 1 did not involve an inventive step for the same reasons as for the main request.

VIII. The respondent's arguments can be summarised as follows:

Main request - inventive step

D1 represented the closest prior art and disclosed a method according to the preamble of claim 1. In the method of D1 the long pulse laser formed the marking by removing a coating applied on the substrate. This removal was not necessarily by ablation. There could be no pointer to the claimed solution, such as a mention of ablation, in the objective problem, which was to be formulated without hindsight. The objective problem

solved by the adoption of ultra-short pulses was thus to provide a method with an improved accuracy of the scale. D1 did not mention this problem. In any event, the person skilled in the art, who was not a laser specialist, would not have consulted D3, which was a research paper concerning lasers. Moreover, even in that case D3 would have taught him away from the adoption of a ultra-short high pulse laser, which was a complex system based on a functioning principle completely different from the conventional laser of D1. Therefore, it was not obvious to arrive at the subject-matter of claim 1 starting from D1.

Admission into the proceedings of auxiliary request 1

Auxiliary request 1 was filed at the earliest possible stage in appeal proceedings. There was no reason to file it during opposition proceedings because both the preliminary opinion and the decision of the opposition division were favourable to the patent proprietor. Hence, auxiliary request 1 should be admitted into the proceedings.

Articles 123(2) and 84 EPC objections in respect of auxiliary request 1

The objections under Article 123(2) and 84 EPC were extremely late-filed, having been raised for the first time at the oral proceedings and without any good reason. Reacting to them would probably require an adjournment of the proceedings. Hence, these objections should not be admitted into the proceedings.

Auxiliary request 1 - inventive step

The evaporated Ni layer of D1 could not be considered as a substrate because it had no supporting function. Moreover in the present claim the markings were formed "at the substrate". Thus, in D1 the substrate was represented by the glass disk. Since there was no reason to replace the glass disk with a metallic substrate, the subject-matter of claim 1 of auxiliary request 1 involved an inventive step.

Reasons for the Decision

1. Main request - inventive step
 - 1.1 It is undisputed that D1, which relates to a method of producing precision marks (Codierspuren 9) for a metrological scale (Codescheibe 1), represents the closest prior art. In the method of D1 a scale substrate is marked at repeated instants by a laser (8), thereby forming a metrological scale. The laser is operated to provide light pulses for forming scale markings at the substrate (column 3, lines 47 to 62). A displacement device (Motor 14) causes relative displacement between the substrate and the location at which the light is incident on the substrate. A controller (Taktgenerator 15) controls the relative displacement and the laser (column 3, lines 51-54). Since D1 does not provide any detail in this respect, the laser used in D1 is understood to be a conventional long pulse laser.
 - 1.2 The Board concurs with the respondent that the objective problem solved starting from D1 is the provision of a method which provides improved accuracy of the scale (paragraph [0002] of the patent). This

problem is solved by the claimed method, wherein the laser produces a plurality of ultra-short output pulses of a fluence at the substrate such that the metrological scale marks are formed by laser ablation, each of said plurality of ultra-short output pulses having a pulse length of less than four picoseconds. The use of an ultrashort pulse laser for producing the graduations on a precision metrological scale (i.e. having tolerance of a few μm per m) is advantageous as it reduces any allowance that has to be made for thermal effects when positioning one graduation relative to others during the graduation marking process, thus scale accuracy is improved (paragraph [0006]).

- 1.3 When producing a metrological scale, the requirement for high precision of the markings is often present. Thus, the person skilled in the art would try to solve the given problem, even if D1 does not explicitly mention it.

In the process of D1 the precision of the markings is determined by the precision of the relative displacement of the support and the precision of the laser operation. Hence, the person skilled in the art would look in these directions for a solution to the problem. Consequently, contrary to the view of the respondent, even without being a laser specialist, he would have consulted prior art documents dealing with precision application of lasers. He would thus have considered the teaching of D3, which is a scientific article that does not describe a specific experiment but rather discusses the application of ultra-short laser pulses, i.e. pulses shorter or equal to 1 ps (page 1706, left-hand column, first sentence of "1. Introduction"), the differences in comparison to long

laser pulses, and the advantages in precision micromachining (abstract).

D3 discloses, for instance on page 1709, right-hand column, last sentence of the first paragraph, that ultra-short laser pulses provide improved precision in comparison to long pulse lasers. Thus, the person skilled in the art would be prompted by D3 to adopt ultra-short laser pulses to solve the problem above.

Contrary to the respondent's opinion the fact that ultra-short laser pulses are generated in a different way than long pulse lasers would not dissuade him from doing so, because he could simply replace the entire laser-generation block of D1 with an ultra-short pulse laser, for instance the one disclosed in D3, without any further modification of the system of D1.

1.4 Therefore, the teachings of D1 and D3 would have rendered it obvious for the person skilled in the art to arrive at the method of claim 1 of the main request. Accordingly, the subject-matter of said claim does not involve an inventive step.

2. Admission into the proceedings of auxiliary request 1

According to Article 12(4) RPBA the Board may hold inadmissible requests which could - and should - have been submitted in opposition proceedings.

Auxiliary request 1 was filed together with the reply to the statement of grounds, i.e. at the earliest possible stage of the appeal proceedings.

In the present case, the opposition division not only finally decided that the granted claims were novel and

inventive, but it had already indicated this view in their preliminary opinion (appealed decision, point 1.7). Hence, the respondent had no reason to file auxiliary request 1 in opposition proceedings.

Under these circumstances, the Board decided to admit auxiliary request 1 into the proceedings.

3. Articles 123(2) and 84 EPC objections in respect of auxiliary request 1

According to Article 13(1) RPBA any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the Board's discretion. The discretion shall be exercised in view of *inter alia* the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy. Amendments sought to be made after oral proceedings have been arranged shall not be admitted if they raise issues which the Board or the other party or parties cannot reasonably be expected to deal with without adjournment of the oral proceedings (Article 13(3) RPBA).

In the present case the objections under Articles 123(2) and 84 EPC were submitted for the first time at the oral proceedings before the Board, i.e. at an extremely late stage of the proceedings.

No justification can be seen for this delay because auxiliary request 1 had been on file since the submission of the respondent's reply to the appellant's statement setting out the grounds of appeal.

Under these circumstances, the Board decided not to admit said late-filed objections into the proceedings.

4. Auxiliary request 1 - inventive step

4.1 In the process of D1, which is directed to the production of light-permeable markings, parts of a light-impermeable layer are removed from a light-permeable support (column 1, lines 4 to 12 and claim 1). In an exemplary embodiment the support is a glass disk with an evaporated Ni layer on it (column 2, lines 57 to 59).

Contrary to the appellant's opinion said Ni layer cannot be considered as a substrate in the sense of present claim 1. First the term "substrate" implies that the material has a supporting function, which requires a certain mechanical stability: this is not the case for the evaporated Ni layer of D1, which cannot exist without the glass support on which it is deposited. Moreover, according to claim 1 the scale markings are formed "at the substrate", whereas in D1 the Ni layer is removed in the areas where the markings are formed.

Therefore, the method of claim 1 of auxiliary request 1 is further distinguished over D1 in that the scale substrate is metallic.

4.2 It was not obvious to modify the method of D1 to use a metallic substrate. As explained above, in D1 the substrate has to be light-permeable. Hence, the choice of a metallic substrate would run contrary to the teaching of D1.

Therefore, claim 1 of auxiliary request 1 involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of the following documents:

Claims

1 to 18 filed as first auxiliary request with letter of 10 December 2014;

Description

pages 2 and 4 filed during the oral proceedings and pages 3, 5 and 6 of the patent as granted;

Figures

1, 2, 3a to 3e of the patent as granted.

The Registrar:

The Chairman:



C. Moser

I. Beckedorf

Decision electronically authenticated