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D E C I S I O N
of 7 September 2005

Case Number: T 1101/04 - 3.2.5

Application Number: 00114317.1

Publication Number: 1068945

IPC: B29D 11/00

Language of the proceedings: EN

Title of invention:

Micro-shape transcription method, micro-shape transcription apparatus, and optical-component manufacture method

Applicant:

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

Headword:

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Relevant legal provisions:

EPC Art. 83, 84, 123(2)

Keyword:

"Clarity (yes)"

"Sufficiency of disclosure (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 1101/04 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 7 September 2005

Appellant: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
1006, Oaza Kadoma Kadoma-shi
Osaka 571-8501 (JP)

Representative: Grünecker, Kinkeldey,
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 27 May 2004
refusing European application No. 00114317.1
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: W. Moser
Members: W. R. Zellhuber
H. M. Schram

Summary of Facts and Submissions

- I. The appellant (applicant) lodged an appeal against the decision of the Examining Division refusing the European patent application No. 00 114 317.1 (publication No. 1 068 945).

The Examining Division held that the distance d referred to in claim 1, on which the decision under appeal was based, was not clear, and, therefore, the requirements of Article 84 were not met. Furthermore, since the application in suit as a whole did not provide a definition of that distance d , the requirements of Article 83 EPC also were not met.

- II. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 7 filed as sole request on 8 June 2005.

- III. Claim 1 of the sole request reads as follows:

"1. Method to control and adjust the operating parameters of an apparatus to manufacture micro-shape optical components within a defined margin of deviation of a pattern in the copy compared to the original master mould pattern, the apparatus being adapted to pressing a transcription face of a master mould, which includes the reverse concavo-convex pattern of the micro-shape, against a mouldable base material, to transcribe the reverse pattern of the surface of the master mould on the surface of the base material, whereby the base material is softened by heating on a temperature T_1 , and after the pattern is copied to the

base material, the master mould is forcibly separated from the base material at a temperature T2,

the operating parameters are adapted to each other to provide for a maximum deviation of copied pattern according to the following formula:

$$|\alpha_a - \alpha_b| * (T1 - T2) * d \leq 4 * 10^{-2} \text{ mm},$$

whereby T1 >= T2 (°C),

α_a (1/°C), being the thermal expansion coefficient of the master mould,

α_b (1/°C), being the thermal expansion coefficient of the base material, and

d (mm), being the maximum distance between the transcription center of the transcription face and the concavo-convex pattern."

IV. In the written procedure, the appellant argued essentially as follows:

When copying a pattern from a master mould to mouldable base material, the base material shrank, and structures within the pattern were deformed because the base material was still in physical contact with the master mould, which might also shrink, but with a different and usually lower thermal expansion coefficient.

The deformation in the pattern depended on the temperature difference between T1 and T2, the difference between the thermal expansion coefficients

of the master mould and the base material, and the distance d , being the distance from the centre of the transcription face to a distant area point of the transcription pattern from the center.

With the formula given in the application in suit it was ensured that any deformations of the pattern in the entire copied pattern did not exceed $4 \cdot 10^{-2}$ mm, and that the resultant product met the predetermined quality standard. An apparatus to manufacture micro-shape optical components could thus be easily operated by adjusting its parameters according to the given formula.

In practise, the dimension of the transcription pattern would be predetermined, and the distance d would be known. The disclosure pertaining to parameter d ("maximum distance between the transcription center of the transcription face and the concavo-convex pattern"), included in the application in suit, cf. claim 1 and paragraph [0018] (published version), was thus not objectionable under clarity considerations.

Reasons for the Decision

1. *Clarity (Article 84 EPC)*

Claim 1 according to the sole request concerns a method to control and adjust the operating parameters of an apparatus to manufacture micro-shape optical components within a defined margin of deviation of a pattern in the copy compared to the original master mould pattern. It contains the relationship

$$|\alpha_a - \alpha_b| \cdot (T1 - T2) \cdot d \leq 4 \cdot 10^{-2} \text{ mm},$$

according to which the operating parameters are adapted to each other to provide for a maximum deviation of the copied pattern. The parameter d (mm) is defined as being the maximum distance between the transcription centre of the transcription face and the concavo-convex pattern. The symbols "<=" and "*" used in the claim according to the sole request have been replaced by the Board by the more commonly used mathematical symbols "≤" and "·".

That relationship is based on the generally known relationship " $\Delta L = L_0 \alpha (T1 - T2)$ " indicating the variation of length (ΔL) of a body of initial length L_0 heated or cooled down from a temperature $T1$ to a temperature $T2$, wherein α represents the thermal expansion coefficient of the body material.

In the application in suit, a maximum value for the difference M between the variation of a "length" ΔL_a of the master mould and the variation of a length ΔL_b of the base material during the cooling phase from temperature $T1$ to temperature $T2$ is set as a criterion for a maximum deviation of the pattern, wherein the initial "length" L_0 corresponds to the distance d between the centre of the transcription face of the master mould and the transcription pattern to be copied.

Since the pattern to be copied should meet the predetermined quality standard, that maximum value ($4 \cdot 10^{-2}$ mm) should be valid for the entire pattern.

Accordingly, the difference M should not exceed $40\ \mu\text{m}$ for any distance between the centre of the transcription face and any area point of the pattern. Since the variations in lengths proportionally increase with the length of the distances (here with the distance from the transcription centre), the distance d can also be defined as being the maximum distance between the transcription centre of the transcription face and any area point of the transcription pattern, which corresponds to the distance between the transcription centre and the outermost area point of the pattern.

Taking into account the common general knowledge of a person skilled in the art, these conclusions are derivable from the disclosure of the application as filed, in particular from the passage describing the problem arising from different thermal expansion coefficients of the materials forming the master mould and the base, and the proposed solution, cf. paragraphs [0013] to [0018] of the application as filed (published version). Consequently, in the Board's view, the expression "the maximum distance between the transcription center of the transcription face and the concavo-convex pattern", used in paragraph [0018] and claim 1 of the application as filed (published version) and claim 1 of the sole request, has to be construed as meaning the maximum distance between the transcription centre of the transcription face and any area point of the transcription pattern.

The subject-matter of claim 1 of the sole request is thus clear and meets the requirements of Article 84 EPC.

2. *Sufficiency of disclosure (Article 83 EPC)*

Since the distance d between the transcription centre of the transcription face and the outermost area point of a pattern to be copied can readily be determined, a person skilled in the art is enabled to control and adjust the operating parameter of the apparatus according to the teaching of claim 1 of the sole request.

The application in suit thus also meets the requirement of Article 83 EPC.

3. *Extension (Article 123(2) EPC)*

Whilst claim 1 of the application in suit as filed concerned a micro-shape transcription method, claim 1 of the sole request concerns "a method to control and adjust the operating parameters of an apparatus to manufacture micro-shape optical components within a defined margin of deviation of a pattern in the copy compared to the original master mould pattern".

Paragraphs [0013] and [0014] of the application in suit (published version) refer to the problem encountered when copying a pattern from a master mould to mouldable base material. From paragraph [0018] of the application in suit (published version), it is directly and unambiguously derivable that the actual solution to that problem, and thus the gist of the invention, is the way of controlling and adjusting the operating parameters of the apparatus used for carrying out the transcription process.

In the Board's view, by directing the claims of the sole request to a method to control and adjust the operating parameters of the apparatus, the application as filed has not been amended in such a way that it contains subject-matter which extends beyond the content of the application in suit as filed. These amendments thus comply with the requirements of Article 123(2) EPC.

The Board notes that replacing the expression at the end of claim 1 of the sole request "... and the concavo-convex pattern" by the expression "... and any area point of the transcription pattern" would not contravene the requirements of Article 123(2) EPC (see point 1 above, penultimate paragraph).

4. The issues of novelty and inventive step were not subject-matter of the decision under dispute. In the Board's view, the appellant should have the opportunity to have these issues considered by two instances.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for further prosecution.

The Registrar:

The Chairman:

M. Dainese

W. Moser