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**Datasheet for the decision
of 10 March 2009**

Case Number: T 1879/06 - 3.2.05

Application Number: 00965645.5

Publication Number: 1226011

IPC: B29C 39/12

Language of the proceedings: EN

Title of invention:

Method of forming a coated optical element and product made thereof

Patentee:

Carl Zeiss Vision Australia Holdings Ltd.

Opponent:

Essilor International (Comp. Générale d'Optique) SA

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 83

Relevant legal provisions (EPC 1973):

-

Keyword:

"Sufficiency of disclosure - yes"

"Novelty - yes"

"Inventive step - yes"

Decisions cited:

-

Catchword:

-



Case Number: T 1879/06 - 3.2.05

DECISION
of the Technical Board of Appeal 3.2.05
of 10 March 2009

Appellant I: Essilor International (Comp. Générale
(Opponent) d'Optique) SA
147, rue de Paris
F-94227 Charenton Cedex (FR)

Representative: Catherine, Alain
Cabinet Harlé & Phélip
7 rue de Madrid
F-75008 Paris (FR)

Appellant II: Carl Zeiss Vision Australia Holdings Ltd.
(Patent Proprietor) Sherriffs Road
Lonsdale, SA 5160 (AUS)

Representative: Jenkins, Peter David
Page White & Farrer
Bedford House
John Street
London WC1N 2BF (GB)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
6 October 2006 concerning maintenance of
European patent No. 1226011 in amended form.

Composition of the Board:

Chairman: W. Zellhuber
Members: H. Schram
C. Rennie-Smith

Summary of Facts and Submissions

- I. Appellant I (opponent) and appellant II (patent proprietor) each lodged appeals against the interlocutory decision of the Opposition Division posted on 6 October 2006 maintaining European patent No. 1 226 011 in amended form

The Opposition Division held that the grounds of opposition under Article 100(a) EPC (lack of novelty, Article 54 EPC, and lack of inventive step, Article 56 EPC), Article 100(b) EPC (insufficient disclosure, Article 83 EPC) and Article 100(c) EPC (inadmissible extension, Article 123(2) EPC) did not prejudice the maintenance of the patent on the basis of claims 1 to 30 filed as first auxiliary request on 6 June 2006.

- II. Oral proceedings were held before the Board of Appeal on 10 March 2009.

- III. Appellant I requested that the decision under appeal be set aside and the patent in suit be revoked.

Appellant II requested that the decision under appeal be set aside and that the patent be maintained on the basis of one of the main or first or second auxiliary requests filed on 5 February 2007, or of the third auxiliary request filed on 10 February 2009.

- IV. Claim 1 of the main request reads as follows:

"1. A method of forming a coated optical element, the method using a mould having first and second mould sections that will form front and back surfaces of the

optical element, one of the mould sections having a casting face, the method including the steps of:

applying a first coating layer to cover the casting face of a mould section, the casting face being capable of imparting a desired optical configuration on a surface of the optical element;

applying a second coating layer to the first coating layer to substantially cover the first coating layer;

filling the mould with an organic liquid material;

hardening the organic liquid material so as to form the optical element adhered to the second coating layer;

characterised by the first coating layer being an abrasion resistant coating layer;

treating the first coating layer to prevent damage to the abrasion resistance coating layer during subsequent steps; and

treating the second coating layer, to provide at least weak adhesion of the second coating layer to the first coating layer and to prevent damage to the second layer during subsequent steps,

wherein the second coating layer is an intermediate coating layer capable of coreacting with the organic liquid material and the abrasion resistant coating layer."

V. The following documents were *inter alia* referred to in the appeal proceedings:

D1 US-A 5,096,626

D2 EP-B 0 102 847

D3 US-A 5,733,483

VI. The arguments of appellant I, in writing and during the oral proceedings, can be summarized as follows:

Insufficiency of disclosure, Article 83 EPC

The application of additional layers on the casting face of a mould section before the first coating layer was applied to cover the casting face thereof, was not sufficiently disclosed, Article 83 EPC.

Objection of lack of novelty, Article 54 EPC

In Example 6 of document D1 the two layers of a double-layer anti-reflecting film 6 were coated on the working surface of a mould and then partially cured, one after the other (fully curing each layer typically required heating the layer at a temperature of up to 300 °C for up to 3 hours, see column 4, lines 57 to 60, of document D1). This meant that the hard coat AN-160 (corresponding to the "intermediate coating layer" of claim 1 of the main request) subsequently applied to film 6 was still capable of coreacting with film 6. Hard coat AN-160 was likewise partially cured and was still capable of coreacting with the optical element. The anti-reflecting film 6 (corresponding to the "first coating layer" of claim 1 of the main request) and the hard coat AN-160 were both abrasion resistant coating layers (see column 6, lines 38 to 44). That the intermediate coating layer was also abrasion resistant was not excluded in the patent in suit, see paragraph [0037]. The subject-matter of claim 1 of the main request was therefore not novel vis-à-vis Example 6 of document D1.

Objection of lack of inventive step, Article 56 EPC

Document D2 was the closest prior document. The subject-matter of claim 1 of the main request differed from the method of forming a coated optical element in that an additional layer was provided between the abrasion resistant outer layer and the optical element. Such an "intermediate layer" was known from document D3 (see Figure 2, wherein an organo silane coating ("coupling agent layer 32") was formed between a reflective coating layer 22 and a hard coat 34. The siloxy groups of coupling agent layer 32 were chemically bonded to layers 22 and 34 (see column 6, lines 13 to 38). It was obvious to the person skilled in the art to apply the teaching of document D3 to the method known from document D2 and thus to arrive at the invention without exercising inventive skills, Article 56 EPC.

- VII. The arguments of appellant II, in writing and during the oral proceedings, can be summarized as follows:

Insufficiency of disclosure, Article 83 EPC

The objection under Article 83 EPC was without foundation. There were clear Examples disclosed, which can readily be carried out by the skilled person, that were within the scope of claim 1 of the main request.

Objection of lack of novelty, Article 54 EPC

The anti-reflecting film 6 in Example 6 of document D1 was a double-layer coating having a total thickness of 0,225 μm , which was thus outside the range for an abrasion resistant layer defined in column 4, lines 66 to 68, namely "usually 1 ~ 10 μm ". Each of the layers of film 6, and the hard coat AN-160 were said to be

hardened at 150 °C, 200 °C and 150 °C, respectively, before the next layer and the resin of the lens were applied. A hardened layer was fully cured and unable to coreact with the next layer. Calling - as appellant I did - the anti-reflecting film 6 the "abrasion resistant coating layer", and the abrasion resistant layer ("hard coat AN-160") the "intermediate coating layer" was turning the objective disclosure of document D1 on its head. It followed from all three arguments that the subject-matter of claim 1 of the main request was novel over document D1.

Objection of lack of inventive step, Article 56 EPC

Document D2 did not remotely disclose or suggest the provision of an intermediate layer. The thrust of document D2 was to provide an in-mould coating technique, whereby specific chemical compositions were chosen for the materials forming the abrasion resistant outer layer and for the optical element such that a firm bond was established between them. In document D2 there was an implicit trade-off between the abrasion resistance of the layer and its capability to adhere to the optical element. Document D2 did not offer a coated optical element with both excellent abrasion resistance and excellent adhesion. The person skilled in the art would not contemplate inserting an intermediate layer between the abrasion resistant outer layer and the optical element of document D2, since the abrasion resistant outer layer would no longer be chemically bonded to the optical element as aimed at in document D2. The invention was predicated on the insight that inserting an additional, intermediate layer between the optical element and its abrasion resistant coating opened the possibility to use abrasion resistant

coatings which were no longer subject to the constraint that they had to form a strong bond with the optical element. Although this new concept added cost and complexity to the method of forming a coated optical element, it had the advantage of using abrasion resistant coatings which was previously not possible. In each of the documents D1, D2 and D3 the abrasion resistant coating was applied directly to the optical element. None of these documents suggested the provision of an intermediate layer. The subject-matter of claim 1 of the main request thus involved an inventive step.

Reasons for the Decision

MAIN REQUEST

1. Insufficiency of disclosure, Article 83 EPC
 - 1.1 Shortly before the end of the oral proceedings before the Board, the issue was raised by the parties whether claim 1 of the main request encompassed the possibility that the casting face of a mould section had one or more layers applied thereto before the first coating layer was applied. Appellant I argued that this possibility was excluded by the wording of claim 1 of the main request, and moreover, that this possibility, viz. the application of additional layers on the casting face of a mould section, was not sufficiently disclosed, Article 83 EPC.

The provisions of Article 83 EPC are fulfilled, when the invention claimed (here: in claim 1 of the main

request) is disclosed in a manner sufficiently clear and complete to be carried out by a person skilled in the art.

Claim 1 of the main request relates to a method of forming a coated optical element, which includes the following steps:

- (1) applying a first coating layer to cover the casting face of a mould section;
- (2) treating the first coating layer (to prevent damage to it during subsequent steps);
- (3) applying a second coating layer to the first coating layer;
- (4) treating the second coating layer (to prevent damage to it during subsequent steps and provide at least weak adhesion to the first coating layer);
- (5) filling the mould with an organic liquid material;
and
- (6) hardening the organic liquid material.

In the judgement of the Board, each of these steps is clearly described in the description (see also the Examples in paragraphs [0068] to [0079] of the patent in suit) and can be carried out by a person skilled in the art. It follows that the invention claimed in claim 1 of the main request interpreted in a straightforward way (for details, see point 1.2 below) meets the requirements of Article 83 EPC.

1.2 Claim construction

It follows from the wording of method claim 1 of the main request that the coated optical element obtained by that method comprises an "optical system" consisting of an optical element having two (single) coating layers on one side (schematically shown below), or on both sides, thereof (cf. paragraph [0028] of the patent in suit):

first coating layer / second coating layer / optical element.

Method claim 1 thus excludes the coating of further layers over the second coating layer. Claim 17 as granted and the first sentence of paragraph [0015] (see page 3, lines 18 to 20) and paragraphs [0041] and [0042] of the patent in suit are therefore deleted in the adapted description.

Appellant I argued that the first coating layer became the outermost layer of the formed optical system, as admitted by Appellant II during the examination proceedings, see the letter of the (then) applicant, dated 12 May 2003, page 2, third full paragraph. Method claim 1 of the main request thus excluded the application of layers to the mould face (layers that became ultimately part of the formed optical system) before the first coating layer was applied. Consequently, paragraph [0034] of the patent as amended by the Opposition Division had to be deleted.

In response Appellant II deleted paragraph [0034] of the patent in suit, but argued that the expression

"applying a first coating layer to cover the casting face of a mould section" should not be construed to mean "applying a first coating layer (directly) to the casting face of a mould section". Whilst the latter expression excluded the presence of a layer, such as eg a release layer, between the mould and the first coating layer, such layer(s) was/were not excluded by claim 1 of the main request.

The issue raised by appellants I and II, namely whether the application of layers to the mould face - before the first coating layer is applied - is excluded or not by claim 1 of the main request, is a question of determining the scope of protection of the claim, see Article 69 EPC and the Protocol on the Interpretation of Article 69 EPC. These provisions are primarily for use by the judicial organs which deal with infringement issues.

For the purposes of judging novelty of the subject-matter of claim 1 of the main request and judging sufficiency of disclosure of the invention claimed in claim 1 of the main request, there is, in the judgement of the Board, no need to decide on the issue raised by appellants I and II and/or to invoke Article 69 EPC and its Protocol.

In a case where the claimed invention, ie the matter for which protection is sought as defined by the claim and supported by the description, cf. Article 84, is sufficiently disclosed (see point 1.1 above), the fact that the claim can be construed to encompass possibilities that have not been explicitly disclosed in the patent does not render the invention unworkable.

2. Objection of lack of novelty, Article 54 EPC

Document D1, which is cited in paragraph [0009] of the patent in suit, discloses a process of moulding a coated plastic lens having a hard coat film 2 and/or anti-reflecting film 6 strongly adhered thereto (see eg column 2, lines 44 to 51, and Figure 3, of document D1).

In Example 6 of document D1 (see column 11, line 35, to column 12, line 8) the hard coat solutions A-140 and AN-190 form hard coat films having a refractive index of $n_1 = 1.40$ and $n_2 = 1.90$ and an optical thickness of $\lambda/4$ and $\lambda/2$, respectively, whereby λ is 510 nm. Hard coat A-140 is applied to the working surface of a glass mould and hardened at 150 °C for 20 minutes, thereafter hard coat AN-190 is applied to hard coat A-140 and hardened at 200 °C for 20 minutes. These two coatings form the anti-reflecting film 6. A third hard coat obtained from the solution AN-160 having an actual thickness of 2 μm is applied to this film and hardened at 150 °C for 20 minutes. The mould is then filled with an organic liquid material.

The optical system thus formed has the following structure: A-140 / AN-190 / AN-160 / optical element. When comparing this optical system with the claimed optical system depicted in point 1.2 above, then the hard coats AN-190 and AN-160, constituting the two layers next to the optical element, correspond to the first and second layer, respectively. As pointed out in point 1.2 above, there is no need for the Board to

consider hard coat A-140 for the purpose of assessing novelty.

Document D1 does not directly and unambiguously disclose that hard coat AN-190 is an abrasive resistant coating layer. The composition of hard coat AN-190 (see column 10, lines 24 to 38) is different from the composition of hard coat AN-160 (see column 11, lines 36 to 52). Only the latter hard coat is described as having resistance to abrasion, see column 6, lines 38 to 40). Whilst hard coat AN-160 has an actual thickness of 2 μm , hard coat AN-190 is a very thin layer, which does not qualify it for use as an abrasive resistant coating layer (for $\lambda = 510 \text{ nm}$ and $n = 1,90$ the actual thickness is $\frac{1}{2} \lambda/n = \frac{1}{2} \times 0,510 \mu\text{m}/ 1,9 \approx 0,134 \mu\text{m}$).

Document D1 does also not disclose that hard coat AN-160 is capable of coreacting with the organic liquid material and with the hard coat AN-190. From the fact that hard coat AN-160 is applied to hard coat AN-190 when the latter is hardened at 200 °C for 20 minutes, it cannot directly and unambiguously derived that hard coat AN-190 is, after hardening, still capable of coreacting with hard coat AN-160.

The subject-matter of claim 1 of the main request is thus novel with respect to document D1.

3. Objection of lack of inventive step, Article 56 EPC

3.1 The invention starts from an in-mould coating technique for manufacturing ophthalmic lenses, whereby a single coating is applied to a face of a mould, partially

curing the coating upon the mould, subsequently assembling the moulds, filling the moulds with a lens monomer, and curing the lens monomer to form a hard lens, see paragraph [0005] of the patent in suit.

The problem the invention seeks to solve is to provide a method of forming a coated optical element ("lens substrate") using an in-mould coating technique, whereby the coating is highly abrasion resistant and has excellent adhesion to the lens substrate, see paragraph [0006] of the patent in suit.

This problem is solved by the subject-matter of claim 1 of the main request. In particular, it is proposed to introduce in the known in-mould coating technique for manufacturing ophthalmic lenses an intermediate layer between the coating layer (henceforth referred to as first coating layer) and the optical element. More precisely, it is proposed to:

- (i) applying a second coating layer to the first coating layer to substantially cover the first coating layer;
- (ii) treating the second coating layer, to provide at least weak adhesion of the second coating layer to the first coating layer and to prevent damage to the second layer during subsequent steps, wherein the second coating layer is capable of coreacting with the organic liquid material and the abrasion resistant coating layer.

3.2 Document D2, which represents the closest prior art, discloses (see page 2, line 62, to page 3, line 11) a

method of providing a single-coated optical element ("lens") including the steps of (i) applying a coating layer to cover the casting face of a mould section with a composition containing reactive ethylenically unsaturated groups; (ii) treating the coating layer to prevent damage to this layer during subsequent steps, ie reacting said material such that it exhibits a degree of unsaturation in the range of 40 to 90% of the unsaturation prior to reaction; (iii) filling the mould with an organic liquid material; and (iv) hardening the organic liquid material so as to form the optical element adhered to the coating layer (step (v) mentioned on page 3, line 11, corresponds to a post-cure cycle of the material of the coating layer). Once the hardening of the lens substrate is complete, the coating layer has been rendered abrasion resistant, see page 5, lines 27 to 28, of document D2.

It may be noticed that in Example 1 of document D2 (see page 9, lines 52 to 54) allyl diglycol carbonate monomer (CR-39) is used as the organic liquid material for the lens, which is the same material as used in Examples 1 to 3 of the patent in suit, see paragraphs [0068] to [0078], see also paragraphs [0059] and [0063]. The coating layer is said to be intimately attached to the lens substrate, since the adhesion is due to a chemical bond, see page 5, lines 23 to 26, of document D2.

The subject-matter of claim 1 of the main request differs from the method of providing a single-coated optical element known from document D2 in that the method provides a double-coated optical element, viz.

it differs from the known method in the additional features (i) and (ii) listed in point 3.1 above.

In the judgement of the Board, the person skilled in the art starting from document D2 and seeking to solve the problem of providing a method of forming a coated optical element, whereby the (first) coating is highly abrasion resistant and has excellent adhesion to the optical element, cannot find a hint or suggestion in document D2 to introduce an intermediate layer between the (first) coating layer and the optical element, because doing so would add costs and complexity to the known method. More importantly, introducing an intermediate layer would obviate step (i) of document D2, ie choosing a composition containing reactive ethylenically unsaturated groups as material for the first coating layer, and step (ii) of document D2, ie reacting said material such that it exhibits a degree of unsaturation in the range of 40 to 90% of the unsaturation prior to reaction, with a view to harden the organic liquid material in step (iv) such that it intimately bonds the (first) coating layer to the optical surface of said hardened organic material.

Whilst multilayer coatings are known per se in the art, see eg document D3 (see Figure 2, wherein a release layer 20, a multilayer reflective coating 22, a coupling agent layer 32 and a hard coat layer 34 are shown), and document D1 discussed in point 2 above, neither of these documents discloses the forming of an intermediate layer between the abrasion resistant layer and the optical element.

It follows that the subject-matter of claim 1 of the main request is non-obvious to the person skilled in the art and therefore involves an inventive step in the meaning of Article 56 EPC.

The subject-matter of dependent claims 2 to 31, and of the process claim 32 of the main request, which includes as a part thereof the method of one of the claims 1 to 31, similarly involve an inventive step.

FIRST TO THIRD AUXILIARY REQUESTS

4. Since the main request of appellant II is allowable, there is no need to consider any of the auxiliary requests of appellant II.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of claims 1 to 32 of the main request filed on 7 February 2007, pages 2 to 4 and 6 to 9 of the description filed on 5 July 2006 and page 5 filed during the oral proceedings before the Board.

The Registrar:

The Chairman:

D. Meyfarth

W. Zellhuber