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Case Number: T 1873/09 - 3.4.02

Application Number: 04710440.1

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Language of the proceedings: EN

Title of invention:
METHODS FOR DESIGNING CUSTOM LENSES FOR IMPROVED VISION AND CORRESPONDING LENSES

Applicant:
Guillon, Michel

Headword:

Relevant legal provisions:
EPC Art. 83, 84, 54, 56

Keyword:

Decisions cited:

Catchword:

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Case Number: T 1873/09 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 11 September 2012

Appellant: (Applicant)	Guillon, Michel 8 Caversham Street London SW3 4AH (ROYAUME UNI)
Representative:	Murray, Adrian D'Coligny WP Thompson 55 Drury Lane London WC2B 5SQ (ROYAUME UNI)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted 20 April 2009 refusing European patent application No. 04710440.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. Maaswinkel
D. Rogers

Summary of Facts and Submissions

I. The appellant lodged an appeal against the decision of the examining division, refusing the European patent application 04 710 440.1. This patent application relates to methods of designing custom ophthalmologic lenses.

According to the decision of the examining division independent apparatus claim 13 then on file was objectionable under Article 84 EPC because the expression "Visual Performance Detrimental Factor" (*in the following:* "VPDF") was not a well established term and should be specified in the claim. Since this term was also not limiting any prior art lens, for instance as disclosed in document D1 (US-B1-6 499 843), anticipated the subject-matter of this claim, (Article 54(1) and (2) EPC). The dependent claims 14 to 40 did not meet the requirements of the EPC with respect to clarity, novelty and/or inventive step.

A similar objection under Art. 84 EPC pertaining to the use of the term "VPDF" was raised against independent method claims 1 and 2. Furthermore, according to paragraph 2.1.3.4 of the Decision referring to page 7 of the description, it was not clear how the mean visual acuity loss was calculated for the individual Zernike coefficients, thus raising doubts whether the disclosure was sufficiently clear and complete (Art. 83 EPC).

II. With the grounds of appeal the appellant filed sets of claims according to a Main Request, basically corresponding to the claims addressed in the Decision but with an explicit reference to the description for

the term VPDF, and a First Auxiliary Request. Furthermore the appellant requested oral proceedings if none of the Requests filed with this letter should be considered allowable.

III. In a communication pursuant to Article 15(1) RPBA accompanying the summons to oral proceedings the board stated that the amendments in the Main Request appeared to be objectionable under Rule 43(6) EPC. With respect to the First Auxiliary Request objections under Article 84 EPC were expressed. Furthermore the conformity of this set of claims with Article 82 EPC was in doubt since it appeared that claims 1 and 2 on the one hand and claims 41 to 44 on the other hand were not so linked as to form a general inventive concept.

IV. With a letter of 1 August 2012 the appellant filed replacement sets of claims according to a Main Request, a First Auxiliary Request and a Second Auxiliary Request for consideration by the board. The auxiliary request for oral proceedings was maintained.

V. Thereupon the board announced that the oral proceedings were cancelled and that the appeal procedure would be continued in writing.

VI. The Main Request of 1 August 2012 includes claims 1 - 17.

The wording of independent claim 1 reads as follows:

" A method for designing a custom lens having a spherical back surface which is tailored for the relative visual effect of different types of aberrations comprising the steps of:

(a) measuring total ocular higher order aberrations for a given pupil and for specific pupil sizes;
(b) calculating the front surface correction needed in terms of Zernike coefficients;
(c) converting the correction using the Visual Performance Detrimental Factor, wherein the Visual Performance Detrimental Factor is calculated using the following steps:

• Calculation of visual acuity loss compared to baseline performance, which is the best corrected visual acuity, for high contrast and low contrast letters, wherein the best corrected visual acuity is determined with best correct sphero-cylindrical refraction,

visual acuity loss =
best corrected visual acuity - visual performance measured

• Calculation of the mean visual acuity loss for high and low contrast charts

mean visual acuity loss = ((visual acuity loss high contrast) + (visual acuity loss low contrast)) / 2

• Calculation of the mean visual acuity loss for all the individual Zernike coefficients

• Calculation of the VPDF for each individual Zernike coefficient

VPDF (Zx) = (mean visual acuity loss for Zx) / (mean visual acuity loss for defocus);

(d) obtaining the relevant higher order aberrations for

correction; and
(e) obtaining the optimised design for the front surface of the lens ".

The wording of independent claim 2 reads as follows:

" A method in which the VPDF is used to optimise the design of both the front and back surface of the lens comprising the steps of:
(a) measuring total ocular higher order aberrations for a given pupil and for specific pupil sizes;
(b) measuring ocular aberrations generated by irregularities of the corneal topography;
(c) calculating the back surface design;
(d) calculating the back surface correction needed in terms of Zernike coefficients;
(e) converting the correction of (d) using the Visual Performance Detrimental Factor, wherein the Visual Performance Detrimental Factor is calculated using the following steps:

• Calculation of visual acuity loss compared to baseline performance, which is the best corrected visual acuity, for high contrast and low contrast letters, wherein the best corrected visual acuity is determined with best corrected sphero-cylindrical refraction,

visual acuity loss = best corrected visual acuity - visual performance measured

• Calculation of the mean visual acuity loss for high and low contrast charts

mean visual acuity loss = ((visual acuity loss high contrast) + (visual acuity loss low contrast)) / 2

• Calculation of the mean visual acuity loss for all the individual Zernike coefficients

• Calculation of the VPDF for each individual Zernike coefficient

VPDF (Zx) = (mean visual acuity loss for Zx) / (mean visual acuity loss for defocus);

(f) calculating the residual aberrations;
(g) calculating the front surface correction needed in terms of Zernike coefficients;
(h) converting the correction of (g) using the Visual Performance Detrimental Factor, wherein the Visual Performance Detrimental Factor is calculated as described in step (e) above;
(i) obtaining the relevant higher order aberrations for correction; and
(j) obtaining an optimised design for the front and back surface of the lens ".

Claims 3 to 17 are dependent claims.

The wording of the claims of the auxiliary requests is not relevant for the purpose of the present decision.

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

In reply to the board's communication new sets of claims are submitted replacing those currently on file. The claims according to the new Main Request correspond

generally to those filed with the First Auxiliary Request on 28 August 2009. Accordingly, it is submitted that the objections raised previously to the term "VPDF" under Article 84 and Rue 43(6) EPC (outlined in para 1 of the Summons) have been overcome. The claims have been further amended to address the objections set out in paragraphs 2 to 4 and 6 of the Summons. Regarding the objections set out in paragraph 5, previous claims 13 to 40 have been deleted. In their place, a new dependent claim (claim 17) has been added, which states that the methods recited in the preceding claims further comprise the step of producing a lens conforming to the optimised lens design. It is submitted that the basis for this claim is provided throughout the application as filed. For example, implicit basis is provided by previous claim 13 in which the method step set out in new claim 17 must have been performed, to produce the previously claimed lens. Basis for new claim 17 is also provided by page 10, lines 4 to 6, lines 8 to 9 and 11 to 12 of the application as filed. Regarding the objections set out in paragraph 7 of the Summons, claims 41 to 44 (now claims 13 to 16) have been amended to depend from claim 1. Specifically, they have been amended to state that the processes recited therein are performed when the step of calculating visual acuity loss compared to base line performance, recited in claims 1 and 2, is carried out.

With respect to the objection in the Decision that claims 1 and 2 do not specify how the VPDF is used to obtain relevant higher order aberrations, the appellant argued that it is not necessary for this to be explicitly recited in the claims in order for them to be understood by the skilled man as this information is provided in the present application. For example, it is

stated at page 7 line 16 that the VPDF is calculated for each individual Zernike coefficient. This assigns different levels of importance (i.e. effect on visual performance) to each individual Zernike coefficient and thus to each higher order aberration. Once the clinician has identified or obtained the relevant higher order aberrations, i.e. those which require treatment as opposed to those which have a minimal effect on vision, he can decide which aberration/s require correcting and which can be left untreated as their effect on vision is minimal - see paragraph spanning pages 7 and 8 of the patent application. Further concerning these claims, it was objected in paragraph 2.1.3.4 that "it is not clear how the mean visual acuity loss is done for individual Zernike coefficients". This information is clearly provided in the description: in Example 1 (page 17, l. 5 to 7) it is stated that distorted visual acuity charts were generated for each specific aberration corresponding to a specific Zernike coefficient. The example goes on to demonstrate plainly how mean visual acuity loss and VPDF can be calculated. Accordingly, claims 1 and 2 as well as their dependent claims do clearly and concisely define the matter for which protection is sought and thus meet the requirements of Article 84 EPC.

Former claims 13 to 40 have been deleted, therefore the objections in the Decision against these claims do not apply.

With respect to former claim 41, now reformulated as claim 13 appended to claim 1 or 2, it was queried in paragraph 2.1.2.4 of the Decision whether it would be possible to provide a test chart exhibiting a distortion with a particular wavefront error. In this respect reference is made to page 6 of the description,

where it is stated in the first paragraph that such charts were produced and in the fourth paragraph that the distortion may be achieved by any suitable means.

Reasons for the Decision

1. The appeal is admissible.

2. *Main Request*

3. *Amendments*

3.1 The board is satisfied that the set of claims complies with the requirements of Art. 84 and Art. 123(2) EPC.

3.2 In particular claims 1 and 2 are based on original claims 10 and 11, including the definition of VPDF as disclosed on page 7, lines 10 to 22 of the description. Therefore, in the opinion of the board, the objections under Art. 84 EPC have been overcome.

In point 2.1.3.4 of the Decision it was argued that "*the question arises whether the invention is disclosed in a manner sufficiently clear and complete for it to be carried out by a skilled person (Art. 83 EPC)*" because claims 1 - 12 were not clear. Although the examining division did not refer to Art. 83 EPC in point 2.5 of its Decision where it set out what it considered the relevant EPC articles for its Decision, it nevertheless appears that the division had at least some doubts concerning sufficiency of the disclosure, although in its reasoning it only addressed the claims and not the full description. The board, however, finds

the reference by the appellant to Example 1 of the description, where explicit values of visual performance and visual loss under different contrast situations for individual Zernike coefficients are reproduced, convincing and consequently considers that the invention is disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, and thus complies with the terms of Article 83 EPC.

3.3 Dependent claims 3 to 12 are based on original claims 12 to 21.

3.4 Claims 13 to 17 do not extend beyond the content of the application as originally filed - see original claim 7 and the disclosure on page 5, 3rd para to page 6, 1st and 2nd para. With respect to the Art. 84 EPC objection against former claim 41 in point 2.1.2.4 of the Decision, the features of which are now included in claim 13, the board concurs with the appellant that there is ample support for the generation of visual acuity test charts in Example 1 on page 17 of the patent application. It is also noted that page 5, penultimate para, discloses that in order to normalise the visual effects of higher order aberrations, images, for example test charts, may be deformed, and that, in particular, an alternative means of achieving the distorted images is by using a deformable mirror. In this respect the explicit reference on page 2, last para of the description to document US 6499843 (*i.e. document D1*) is noted where in col. 5, l. 37 to 47 the use of a deformable mirror for the measurement and correction of higher-order wavefront aberrations is disclosed.

4. *Patentability*

4.1 *Novelty*

4.1.1 In the Decision an objection pertaining to lack of novelty had been raised against former apparatus claim 13. In the opinion of the examining division the lens defined in that claim was not novel over the disclosure in document D1 "*if all clearly limiting features are taken into account*". The present set of claims does not include an apparatus claim addressing a lens as the objected former claim 13, therefore, this objection no longer applies.

4.1.2 In the first instance proceedings no reasoned objection with respect to novelty of the method claims 1 and 2 was expressed. Indeed, none of the available prior art documents D1 (*the only document explicitly addressed in the Decision*) or D2 to D6 (*these documents have only been reproduced in the list of prior art in point 1.13 of the Decision*) disclose the concept of VPDF in a method for designing lenses, therefore it is concluded that the subject-matter of the independent claims 1 and 2 is novel by virtue of this feature.

4.2 *Inventive step*

4.2.1 *Closest prior art*

Document D1 is considered to disclose the closest prior art since, as set out on page 2, last para of the description of the present patent application, it is related to techniques of measuring higher order aberrations and using the data to design ophthalmologic lenses. The problem to be solved in the light of document D1 is to find an alternative way for designing ophthalmologic lenses.

4.2.2 In particular in the design process disclosed in this document steps (a) and (b) of claims 1 and 2 are carried out, since the higher-order aberrations are measured and corrected and the surface correction is calculated in terms of Zernike polynomials and coefficients, see col. 5, lines 45 to 50 of D1.

4.2.3 Document D1 neither discloses nor suggests the concept of converting the correction by using the VPDF as defined in step (c) of claim 1, respectively step (e) of claim 2. Since in this way the relevance of each individual Zernike coefficient for the visual effect can be considered these claims may lead to an optimised lens design. Neither document D1 nor any of the other available prior art documents discloses or hints at this solution.

4.2.4 Therefore the subject-matter of claim 1 and claim 2 of the Main Request involves an inventive step and defines patentable subject-matter

4.2.5 Claims 3 to 17 are dependent claims and are equally allowable.

4.3 For the above reasons, the board finds that the appellant's Main Request meets the requirements of the EPC and that a patent can be granted on the basis thereof.

4.4 Since the description has not been yet adapted to the claims the case is remitted to the first instance to bring the description into conformity with the new set of claims.

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 to grant a patent with claims 1 to 17 of the Main Request, as received with the letter of 1 August 2012, the Figures 1 to 6 (pages 1/3 to 3/3) as published and a description to be adapted.

The Registrar: The Chairman:

M. Kiehl A. G. Klein

Decision electronically authenticated