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**Datasheet for the decision
of 18 June 2024**

Case Number: T 1917/22 - 3.4.02

Application Number: 10741835.2

Publication Number: 2396683

IPC: G02B3/10, A61F2/12, G02C7/06,
G02C7/04, G02B5/18, A61F2/16

Language of the proceedings: EN

Title of invention:
DIFFRACTIVE TRIFOCAL LENS

Patent Proprietor:
The Arizona Board Of Regents On Behalf Of
The University Of Arizona

Opponents:
Wrays Solutions Pty Ltd
Physiol

Relevant legal provisions:
EPC Art. 54(1), 54(2), 54(3), 56, 83, 84, 123(2)
RPBA 2020 Art. 13(2)

Keyword:

Admittance of claim request filed after summons (yes),
exceptional circumstances
Added subject-matter (no)
Clarity and sufficiency of disclosure (yes)
Novelty and inventive step (yes)

Decisions cited:

G 0003/14



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Case Number: T 1917/22 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 18 June 2024

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
30 May 2022 concerning maintenance of the
European Patent No. 2396683 in amended form.

Composition of the Board:

Chairman R. Bekkering
Members: F. J. Narganes-Quijano
 G. Decker

Summary of Facts and Submissions

- I. Opponent 1 (appellant) lodged an appeal against the interlocutory decision of the opposition division finding European patent No. 2396683 as amended according to the then fourth auxiliary request to meet the requirements of the EPC.

The oppositions filed by the appellant and opponent 2 against the patent as a whole were based on the grounds for opposition of added subject-matter (Article 100(c) EPC), insufficiency of disclosure (Article 100(b) EPC), and lack of novelty and of inventive step (Article 100(a), together with Articles 52(1), 54(1) and 56 EPC).

- II. Among the documents cited during the first-instance proceedings, the following documents were considered by the parties in the present appeal:

D5: EP 2 377 493 A1

D6: EP 2 378 319 A1

D7: IE 68759 B1

E11: EP 0 109 753 A2 (also cited as D15 in the decision under appeal).

In the decision under appeal the opposition division held *inter alia* that the patent as amended according to the then fourth auxiliary request complied with the requirements of Articles 123(2) and 83 EPC and that the claimed subject-matter was new and involved an inventive step over the prior art documents considered during the opposition proceedings (Article 52(1), together with Articles 54(1) and 56 EPC).

III. With the statement of grounds of appeal the appellant submitted the following document as an annex:

A1: "IE 68759 B1 (D7)", calculations (two pages).

IV. With its letter of reply dated 23 February 2023 the patent proprietor (respondent) submitted the following document:

A2: Declaration of G. W. Forbes dated 23 February 2023 (eight pages, and a curriculum vitae as an annex).

V. With the letter of 16 August 2023 (wrongly dated 16 August 2022) the appellant filed the following document:

D45: Declaration of V. Portney dated 7 August 2023 with "Annexure VP-1" to "Annexure VP-3" (sixteen pages).

VI. With the letter dated 12 January 2024 filed in reply to a communication issued by the board under Article 15(1) RPBA the respondent submitted *inter alia* claims 1 to 8 of a seventh auxiliary request.

VII. With the letter dated 18 May 2024 the appellant referred to the following documents already considered during the first-instance proceedings:

D3: US 4 936 666 A

D10: US 4 210 391 A

D33: "Spectral properties of multiorder diffractive lenses", D. Faklis *et al.*; Applied Optics Vol. 34 (1995), pages 2462 to 2468,

and filed the following document:

D46: "Diffractive Optics - design, Fabrication, and Test", D. C. O'Shea *et al.*; Tutorial Texts in Optical Engineering, Vol. TT62, SPIE Press, 2004 (Second Printing 2015); two bibliographic pages, and pages 8 bis 12, 67 bis 70, 197 bis 199 and 211.

VIII. Oral proceedings before the board were held on 18 June 2024 in the presence of the appellant, the respondent and opponent 2 as party as of right.

The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained in the following version:

- Claims: No. 1 to 8 according to the seventh auxiliary request filed with the letter of 12 January 2024.

- Description: Pages 1 to 12 according to the fourth auxiliary request filed during the oral proceedings before the opposition division on 28 April 2022.

- Drawings: Pages 11 to 14 of the patent specification.

At the end of the oral proceedings the chairman announced the decision of the board.

IX. Claim 1 of the sole request of the respondent - with the feature labelling in square brackets being inserted therein by the board - reads as follows:

"[1.1] A diffractive multifocal lens comprising
[1.2] an optical element having a first diffractive optical surface (102) [1.2.1] having a radial surface profile (130) having a diffractive structure comprising a plurality of concentric annular zones (104) concentric with a central zone and [1.2.2] assignable, from the outer edge of the central zone to the edge of the lens, as alternating odd and even numbered zones each having a projected surface area that is equal,
[1.3] wherein the optical thickness of the lens changes monotonically within each zone,
[1.4'] a distinct step in optical thickness occurs at the outer periphery of each zone (104), at the junction between the zones (136, 138),
[1.6'] the height of the steps alternating between two values (A1, A2),
[1.7] with this alternating step height pattern repeating periodically from the center to the edge of the lens [1.8] so as to tailor the proportions of the diffraction order efficiencies of at least a zeroth, positive first, and positive second, diffractive order of the radial surface profile (130) of the optical element,
[1.9] wherein the lens has a radial phase profile, of the optical phase change introduced by the diffractive structure, and
[1.10] the radial phase profile within each of the concentric annular zones (104) consists of a sawtooth shape (141), characterized by a sharp peak (142, 146) having a leading edge (124) that rises from a first value normalized to zero, gradually to a peak value, and a trailing edge (128) that falls abruptly from the peak value back to the first value,
[1.11] wherein the first value is the same for each sawtooth shape (141)."

The respondent's request also includes dependent claims 2 to 8 referring back to claim 1.

Reasons for the Decision

1. The appeal is admissible.
2. *Admittance - Article 13(2) RPBA*
 - 2.1 The claims of the present request of the respondent were submitted with the letter dated 12 January 2024 filed in reply to the board's communication under Article 15(1) RPBA. The amended claims differ from the claims of the fourth auxiliary request underlying the decision under appeal only in that features 1.4' and 1.6' of present claim 1 (see point IX above) replaced the following features of claim 1 of the mentioned fourth auxiliary request: "[1.4] a distinct step in optical thickness occurs at the junction between the zones (136, 138), [1.5] the height of the steps differs between each adjacent zone, and [1.6] the step heights between each zone alternate between two values (A1, A2)" [feature labelling "1.4" to "1.6" inserted by the board]. These features 1.4 to 1.6 constituted in turn an amendment of a corresponding feature of claim 1 as granted reading "a distinct step in optical thickness occurs at the junction between the zones (136, 138), the height of the steps differs between adjacent zones [...]".

The respondent submitted that the claims of the present request should be admitted into the proceedings under Article 13(2) RPBA because they were filed in reaction

to an objection raised under Article 84 EPC for the first time by the board in its communication under Article 15(1) RPBA.

The appellant submitted that the claims were late filed and that, therefore, they should not be admitted into the proceedings.

Opponent 2 submitted that the objection of lack of clarity raised by the board in its communication had already been raised - although not specifically under Article 84 EPC, at least in substance - during the first-instance proceedings, in particular in the notice of opposition of the appellant and in the appellant's reply to the summons to the first-instance oral proceedings. In addition, the objection had also been considered under Article 84 EPC by the opposition division in its decision. For these reasons, the amended claims should not be admitted into the proceedings.

- 2.2 It is first noted that the objection raised by the board under Article 84 EPC in the communication annexed to the summons to oral proceedings was not directed to possible unclarities already present in claim 1 as granted, but to unclarities introduced by the amendments to claim 1 as granted resulting in features 1.4 to 1.6 of claim 1 of the then fourth auxiliary request and, more particularly, to unclarities in the expressions "the height of the steps differs between each adjacent zone" and "the step heights between each zone" (emphasis added by the board) which differ from the corresponding expressions of claim 1 as granted. It is also noted that several possible unclarities and ambiguities of both claim 1 as granted and of claim 1 amended according to different requests filed during

the first-instance proceedings - and in particular of the mentioned fourth auxiliary request - were addressed during the first-instance proceedings. However, all these possible deficiencies were only mentioned in support of the substantiation of objections of added subject-matter (Articles 100(c) and 123(2) EPC) and/or of insufficiency of disclosure (Articles 100(b) and 83 EPC) raised by the opponents and there is no record in the file that the alleged deficiencies were specifically raised as objections under Article 84 EPC, let alone that they concerned unclarities specifically arising from the formulation of the expressions mentioned above in features 1.4 to 1.6 of claim 1 of the then fourth auxiliary request. In particular, the appellant's notice of opposition could not have addressed the objection raised by the board in its communication because this objection specifically concerned amendments made to the patent during the opposition proceedings. Furthermore, the unclarities referred to by opponent 2 as being addressed in the appellant's letter filed in reply to the summons to the first-instance oral proceedings were mentioned in this letter in the substantiation of an objection of lack of sufficiency of disclosure and concerned the features of claim 1 and of dependent claims 4 and 11 as granted relating to multiple step heights "between two [...] adjacent zones" (see letter dated 28 February 2022, page 4, sixth paragraph). In addition, the statement in point 19.4.2 of the reasons of the decision under appeal according to which "[t]he sufficiency of disclosure argumentation [of features 1.2.1, 1.2.2, 1.6 and 1.7 of claim 1 of the fourth auxiliary request] related in many cases refers [*sic*] to a lack of clarity which is not a ground for opposition" only concerns, in view of decision G 3/14 (OJ EPO 2015, 102), to possible unclarities already present in claim 1 as granted and

not arising from the specific amendments introduced into claim 1 of the then fourth auxiliary request.

For these reasons, the board considers that the objection under Article 84 EPC at issue was raised for the first time in the mentioned board's communication. In addition, the board sees no reason why the respondent should have anticipated this specific objection or should already have filed the claims of the present request at an earlier stage of the proceedings. In the board's view these circumstances constitute exceptional circumstances within the meaning of Article 13(2) RPBA and, in view of the circumstances of the case, the board considered appropriate to take into account in the proceedings the claims of the present request of the respondent (Article 13(2) RPBA).

3. *Article 84 EPC*

Claim 1 of the present respondent's request has been amended in several respects when compared with claim 1 as granted and the board is satisfied that these amendments comply with the requirements of clarity of Article 84 EPC. In particular, features 1.4' and 1.6' overcome the objection raised by the board under Article 84 EPC and referred to in point 2 above and, in addition, neither the appellant nor opponent 2 raised objections of lack of clarity under Article 84 EPC in respect of the amendments made in claim 1 of the present request when compared with claim 1 as granted.

4. *Article 123(2) EPC*

- 4.1 In its decision the opposition division concluded that the claims of the fourth auxiliary request underlying the decision under appeal complied with Article 123(2)

EPC. In addition, the further amendments made to claim 1 according to the present request when compared with claim 1 of the then fourth auxiliary request (see point 2.1 above, first paragraph) are based on page 3, line 29, to page 4, line 5, of the application as originally filed.

Throughout the proceedings the appellant raised objections under Article 123(2) EPC in respect of features 1.2.1, 1.2.2, 1.6' and 1.7 to 1.11 of claim 1. However, in the board's view these objections are not persuasive for the following reasons:

- 4.1.1 According to a first objection raised by the appellant, while the application as originally filed disclosed that the optical surface of the lens had a surface profile comprising a plurality of concentric annular zones, feature 1.2.1 of claim 1 referred to a radial surface, i.e. to a two-dimensional cross-sectional profile (i.e. a line) of the lens taken along a radius of the lens. As such, it did not and, indeed, could not comprise annular zones or rings. Therefore, claim 1 was inconsistent with the application as filed and there was no basis for feature 1.2.1.

The board first notes that the appellant's argument relates to an objection of lack of clarity that cannot be raised under Article 84 EPC in respect of claim 1 because the corresponding feature was already present in claim 1 as granted and Article 84 EPC is not a ground for opposition under Article 100 EPC (see in this respect decision G 3/14 cited in point 2.2 above). It is also noted that the appellant's objection is based on a strict literal interpretation of the expression "radial surface profile" and that this interpretation leads not only to an inconsistency with

the application as filed as submitted by the appellant, but also to a conceptual inconsistency as such because the annular zones defined in claim 1 are two-dimensional and - as submitted by the appellant - a line cannot comprise a two-dimensional object. The skilled person would therefore rule out this literal interpretation and would understand the expression "radial surface profile" in the technical context of claim 1 (see "plurality of concentric annular zones (104) concentric with a central zone") as designating a two-dimensional surface profile extending from a point in all the radial directions so that the optical thickness of the lens changes in each radial direction as claimed and also as disclosed in the application as filed (page 3, lines 28 and 29), i.e. monotonically within each zone.

In addition, the application as filed discloses that "the surface profile [of the diffractive surface] comprises a plurality of concentric annular zones. The optical thickness of the radial surface profile [...]" (page 3, lines 27 to 29) and, as submitted by the respondent, the claimed feature objected to by the appellant is directly and unambiguously derivable from this passage of the original application.

4.1.2 According to a second objection raised by the appellant, Fig. 5 of the application as filed represented the optical phase change introduced by the diffractive structure of Fig. 4 and the figure included two labels "odd" and "even", but it did not disclose alternating odd and even numbered zones and the two labels were not for concentric annular zones. In particular, the odd label designated a circular central zone. In addition, there was no depiction of the "edge of the lens" in Fig. 5, and in Fig. 4 the diffractive

zones did not reach the edge of the lens. Therefore, these figures were not consistent with feature 1.2.2 of claim 1 and there was no direct and unambiguous basis in the application as filed for this feature.

The board first notes that the claimed feature according to which the concentric annular zones are "assignable, from the outer edge of the central zone to the edge of the lens, as alternating odd and even numbered zones" constitutes only a labelling of the concentric annular zones devoid of technical significance when claim 1 is taken in isolation because the mere fact of designating or labelling the zones with odd and even numbers does not determine any technical feature of the lens defined in claim 1. The mentioned feature acquires a technical significance only when claim 1 is read together with dependent claims 2 and 3 according to which "the step heights (136, 138) of the even numbered zones (104) are" respectively "greater" and "less" "than the step heights of the odd numbered zones", these features defining respectively a technical limitation and implying that the step heights of the first, third, etc. concentric annular zones counted from the concentric annular zone close to the central zone are either "less" or "greater" than the steps height of the even numbered (second, fourth, etc.) concentric annular zones. However, firstly, dependent claims 2 and 3 of the present request correspond to dependent claims 2 and 4 of the application as filed, secondly, claim 1 together with dependent claims 2 and 4 as filed left open whether the concentric annular zones were to be counted starting with an odd or an even number for the concentric annular zone close to the central zone and, thirdly, dependent claims 2 and 4 as filed defined two complementary alternatives (see also page 7, lines 21

to 24 of the application as filed). It follows that the technical features determined by each of dependent claims 2 and 3 (i.e. that the step heights of the first, third, etc. concentric annular zones counted from the first concentric annular zone close to the central zone are either "less" or "greater" than the step heights of the remaining annular zones) were disclosed in the application as filed.

Therefore, feature 1.2.2 of claim 1 relating to the mere labelling of the concentric annular zones does not determine any technical feature - in particular, any technical information or limitation - that would go beyond the application as filed and, in addition, to the extent that the mentioned labelling determines a technical feature in each of dependent claims 2 and 3, these technical features are directly and unambiguously derivable from the application as filed. For this reason alone, feature 1.2.2 does not contravene the requirements of Article 123(2) EPC.

It is also noted that, in any case, feature 1.2.2 of claim 1 is, as such, derivable from the content of the application as filed. The plot of the optical phase of Fig. 5 represents the optical phase change introduced by the zones of the diffractive structure of Fig. 4 (application as filed, page 5, lines 1 and 2). Moreover, the skilled person would - as submitted by the respondent - understand that each sawtooth element of Fig. 5 corresponds to a respective one of the physical zones of Fig. 4 and that the labelling of the sawtooth elements of Fig. 5 also relate to the numbering of the zones of Fig. 4. In addition, the application as filed mentions in respect of the alternate steps having two different values of the height of exemplary embodiments that "the even-numbered

step heights [are] lower than the odd-numbered step heights [and] [i]n alternative embodiments the even-numbered step heights may be higher than the odd-numbered step heights" (page 4, second paragraph) and that "odd-numbered step heights are greater than even-numbered step heights, though in alternative embodiments, the reverse may be stipulated" (page 7, lines 21 to 24). Furthermore, as noted by the opposition division in its decision and by the respondent, the fact that the annular zones are assignable from the outer edge of the central zone "to the edge of the zone" is also derivable from the application as filed (see claim 1: "step height differences between two or more adjacent zones repeats periodically from the center to the edge of the lens", and page 7, lines 9 and 10: "This alternating step height pattern is repeated out to the edge of the lens").

- 4.1.3 According to a third objection raised by the appellant in respect of features 1.6' and 1.7, the fact that the height of the steps alternated "between two" values did not necessitate that the two values were the same two values across the entire optical surface and features 1.6' and 1.7 covered a repeating pattern "a b a b ..." having different groups "a" and "b" of zones in which the height of the steps differed between adjacent zones and the step heights between adjacent zones alternated between two values (see pattern represented on page 4 of the statement of grounds of appeal). The original application, and in particular claim 1 ("a pattern of step height differences [...] repeats periodically [...]"), focused on a pattern of differences in steps height, whereas feature 1.7 ("alternating step height pattern repeating periodically [...]") focused on the alternating step heights themselves.

However, the appellant's objection is not convincing because the objected feature is - as submitted by the respondent - based on the passage of the application as filed according to which "the step heights alternate between two values, the even-numbered step heights being lower than the off-numbered step heights" (page 4, lines 3 to 5), and the skilled person would understand that the mentioned two values are the same two values through the claimed diffractive structure (see page 7, lines 9 and 10: "This alternating step height is repeated out to the edge of the lens."). In addition, a pattern of step heights alternating between two values (application as filed, page 4, lines 3 to 5, and page 7, lines 5 to 9, together with Fig. 4) such as H1, H2, H1, H2, etc. determines univocally a pattern of step height differences also alternating between two values (see claim 1 as originally filed), i.e. H1-H2, H2-H1, H1-H2, etc. It is also noted that, while claim 1 as filed refers to "a pattern of step height differences [...] repeat[ing] periodically ...", the application as filed referred in the summary of the invention to the alternating step heights (see "the step heights for adjacent zones differ from one zone to another periodically [...] on page 3, lines 31 to 33).

- 4.1.4 According to a fourth objection, while feature 1.8 of claim 1 recited tailoring "the proportions of the diffraction order efficiencies", the application as filed only recited tailoring the diffraction order efficiencies, wherein the diffraction efficiency "refer[ed] to the percentage of incident light power transmitted into each of the various diffractive orders comprising the diffraction pattern at the focal plane".

The board notes, however, that the appellant's arguments are based on a purely linguistic analysis and that the appellant has not identified any difference of a technical nature between

- the feature of claim 1 reading "tailor[ing] the proportions of the diffraction order efficiencies" of different diffractive orders, and

- the feature "tailor[ing] diffraction order efficiencies" of claim 1 as filed, wherein according to the application as filed the expression "'[d]iffraction order efficiency' refers to the percentages of incident light power transmitted into each of the various diffractive orders" (application as filed, page 2, lines 14 to 16) and "the diffraction efficiencies" of the diffractive orders defined in present claim 1 "have a selected proportion to one another" (dependent claim 9 as filed; see also page 4, lines 10 to 13 disclosing "directing a desired proportion of light power into designated diffraction orders").

In addition, tailoring the percentage would - as submitted by the respondent - also tailor the proportions, and the board cannot identify in the feature 1.8 of claim 1 any new technical information not already disclosed in the application as filed.

- 4.1.5 According to a fifth objection, features 1.9 to 1.11 of claim 1 constituted an unallowable intermediate generalisation of the embodiment of Fig. 4 and 5 of the application as filed because the mentioned features included radial phase profiles with, for instance, sawtooth elements having a concave or a convex shape, in particular at the leading or at the trailing edge of the elements (see the profiles represented on page 5 of the statement of grounds of appeal).

However, features 1.9 and 1.10 of claim 1 are fulfilled by the specific embodiment of the invention represented in Fig. 4 and 5 of the application as filed (see page 7, lines 9 to 16) and, in addition, they are first disclosed in connection with the prior art (see page 1, line 32, to page 3, line 23, and Fig. 3 together with the corresponding description on page 6, line 20, to page 6, last line, in particular page 6, lines 20 to 23) on the basis of which the invention, as defined in section "Summary" on pages 3 and 4 of the description, is then disclosed in the description of the application as filed. For these reasons - and as submitted by the respondent - the skilled person would not see features 1.9 and 1.10 as being disclosed in the application as filed exclusively in connection with the specific embodiment of Fig. 4 and 5, but disclosed in the context of the application as filed as a feature underlying, and common to, the radial phase profiles of the lenses of the invention (see section "Summary" of the invention on pages 3 and 4, and Fig. 4 and 5). Consequently, in the board's view there is no reason to see present claim 1 as an intermediate generalisation - let alone as an unallowable one - of the specific embodiment of Fig. 4 and 5. Similar considerations apply to feature 1.11.

It follows from these considerations and those submitted by the respondent that features 1.9 to 1.11 of claim 1 are neither specifically or exclusively based on, nor limited to the specific embodiment of Fig. 4 and 5, and that, therefore, the mere fact that claim 1 "includes" the specific phase profiles mentioned by the appellant and that these specific phase profiles are different from the specific phase profile represented in Fig. 5 and are not explicitly disclosed in the application as filed is *per se* not

objectionable under Article 123(2) EPC because the specific phase profiles mentioned by the appellant are already encompassed by the disclosure of the claimed invention in the application as filed (see for instance claim 1, and Fig. 3 together with the passage on page 6, lines 20 to 23, on which features 1.9 to 1.11 are based).

- 4.1.6 According to the sixth objection raised by the appellant, features 1.6' and 1.9 to 1.11 constituted an unallowable intermediate generalisation because they did not include other features of the specific embodiment of Fig. 4 and 5 disclosed in the application as filed and to which the amendments introduced into claim 1 were directed. In particular, claim 1 omitted features relating to the specific shape of the radial surface profile (page 7, lines 7 to 9 of the application as filed), the specific values of the phase assigned to the step heights (page 9, lines 28 and 29) and the lower refractive surface of the lens (page 7, line 3). The same applied to the claimed feature 1.8 relating to tailoring the diffraction order efficiencies of "at least a zeroth, positive first, and positive second, diffractive order" because the embodiment of Fig. 4 and 5 involved tailoring these three orders only.

The board notes, however, that these objections are based on the appellant's assumption that claim 1 is specifically and exclusively based on, and therefore limited to the specific embodiment disclosed in the application as filed by reference to Fig. 4 and 5. However, as already noted in point 4.1.5 above, this is not the case. In addition, as submitted by the respondent, the claimed features objected to by the appellant are directly and unambiguously derivable from

the application as filed (see, in particular, page 4, lines 3 to 6, page 7, line 19, to page 10, line 2, and claims 2, 4 and 9) and the features identified by the appellant as being missing in claim 1 are not disclosed as being inextricably linked with the mentioned claimed features.

- 4.1.7 The appellant also objected in connection with the objection addressed in point 4.1.6 above that the features of dependent claims 3, 4 and 7 and the feature of dependent claim 6 relating to the radial surface profile height of each zone formed an arc should be included in claim 1, and that the features of dependent claim 2 were inconsistent with the embodiment of Fig. 4 and 5 of the application as filed and, consequently, should be deleted.

These objections, however, are not persuasive in view of the board's considerations in point 4.1.6 above, second paragraph, and point 4.1.2 above, second paragraph.

- 4.2 In view of these considerations, the board concludes that the claims of the respondent's present request meet the requirements of Article 123(2) EPC.

5. *Article 83 EPC*

- 5.1 The appellant raised a series of clarity issues in claim 1 and submitted that these issues led to the person skilled in the art not being able, without undue burden, to carry out the claimed invention as required by Article 83 EPC.

However, in the board's view none of the objections raised by the appellant are convincing for the following reasons:

- 5.1.1 According to a first objection, the radial surface profile of the lens defined in claim 1 showed a cross-section of the lens and did not have concentric annular zones. Rather, the whole surface of the lens exhibited the concentric annular zones. Therefore, the claimed radial surface profile comprising concentric annular zones was inconsistent with the description and created a lack of clarity which led to insufficiency of disclosure.

The board notes that this objection raised under Article 83 EPC is related to the objection under Article 123(2) EPC addressed in point 4.1.1 above and that the objection is based on an interpretation of claim 1 that the skilled person would, on the basis of the common general knowledge, rule out as inconsistent for the reasons already given in point 4.1.1 above, second and third paragraphs.

- 5.1.2 According to a second objection, while claim 1 requires numbering the annular zones as "alternating odd and numbered zones" commencing from the outside of the central zone, in the embodiment of Fig. 5 disclosed in the description the central zone is identified as an "odd" zone. Therefore, claim 1 was unclear and, in addition, inconsistent with the description as regards the way the alternating odd and even numbered zones were assigned.

The board first notes that this objection relates to the objection under Article 123(2) EPC addressed in point 4.1.2 above and that it constitutes an objection

of lack of clarity and of lack of support in the description which cannot be raised under Article 84 EPC for reasons similar to those already given in point 4.1.1 above, second paragraph, first sentence. In addition, in view of the board's comments in point 4.1.2 above, the board does not see in what respect the mentioned objections would be detrimental to sufficiency of disclosure. In particular, the definition given in claim 1 results in a physical entity (a diffractive multifocal lens) the technical features of which appear to be independent of whether the concentric annular zones are conceptually labelled as odd and even, or as even and odd, when starting with the concentric annular zone close to the central zone, and also independent of whether the central zone is conceptually labelled or not.

- 5.1.3 According to a third objection, claim 1 referred to tailoring "the proportions of" the diffraction order efficiencies. In view of the definition of "diffraction efficiency" in paragraph [0005] of the patent, claim 1 was inconsistent with the description.

This objection relates to the objection under Article 123(2) EPC already addressed in point 4.1.4 above and it also constitutes an objection of lack of support in the description that cannot be raised under Article 84 EPC for reasons similar to those given in point 4.1.1 above, second paragraph, first sentence. In addition, in view of the considerations in point 4.1.4 above the board is unable to see in what respect the appellant's arguments would prejudice the sufficiency of disclosure of the claimed lens.

- 5.1.4 As a fourth objection the appellant submitted that, in view of the objections addressed in points 4.1.5 and

4.1.6 above, claim 1 was not supported by the description because it only disclosed one single specific example and the patent failed to disclose a multitude of radial phase profiles of a diffractive multifocal lens that would fall within the scope of claim 1. Therefore, the patent failed to sufficiently disclose the invention across the scope of claim 1.

The board notes that the objections of unallowable intermediate generalisation addressed under Article 123(2) EPC in points 4.1.5 and 4.1.6 above are in the board's view not persuasive (see points 4.1.5, second and third paragraphs, and point 4.1.6 above, second paragraph), and that, in any case, the board does not see in what respect any of these objections would be detrimental to sufficiency of disclosure of the claimed invention. It is also noted that, contrary to the appellant's submissions, there is no need under Article 83 EPC for the patent specification to disclose "a multitude" of radial phase profiles that would fall within the scope of claim 1 (see in this respect "Case Law of the Boards of Appeal of the European Patent Office", 10th edition 2022 ("Case Law"), section II.C.5.2) and that, as submitted by the respondent, the appellant's submissions contain no technical argument, let alone any evidence or verifiable fact, that would support insufficiency of disclosure within the meaning of Article 83 EPC.

5.2 The board concludes that none of the appellant's submissions are sufficient to call into question sufficiency of disclosure of the claimed invention within the meaning of Article 83 EPC.

6. *Novelty*

6.1 Document D5

- 6.1.1 The appellant submitted that the subject-matter of claim 1 was not new in view of document D5.

The board notes that, while the patent in suit has a filing date of 12 February 2010 and claims a priority of 12 February 2009, document D5 (priority date of 6 January 2009 and filing date of 8 April 2009) is a European patent application the corresponding International application of which was published on 15 July 2010. It follows that document D5 represents, at the most, state of the art within the meaning of Article 54(3) EPC only under the condition that the priority of document D5 was validly claimed or, in the event that this priority was not validly claimed, under the condition that the priority of the patent in suit was not validly claimed. Under the assumption that any of these conditions is satisfied, the board notes the following:

- 6.1.2 Document D5 discloses a diffractive multifocal lens with an optical surface having a diffractive structure comprising a plurality of concentric annular zones concentric with a central zone. The diffractive structure generates a radial phase profile of the claimed type, i.e. a radial phase profile having within each of the concentric annular zones a sawtooth shape having a leading edge that rises from a first predetermined value gradually to a peak value, and a trailing edge that falls abruptly from the peak value back to a second predetermined value.

However, while claim 1 requires that the first and second predetermined values are a common "first value normalized to zero" and that "the first value is the

same for each sawtooth shape", there is no disclosure in document D5 (see in particular Fig. 3 and 10) from which it could directly and unambiguously be derived that the phase profile of the lens would satisfy that the mentioned first and second predetermined values have a common value and that this common value is the same for all sawtooth shapes.

The board notes in this respect that the mere fact that the claimed first value is "normalized to zero" appears to merely imply - as submitted by the respondent by reference to document A2, point 4 - that the whole phase profile is shifted or offset by a constant phase value, and that this normalization does not have any technical significance in the technical context of the lens defined in claim 1 because what is technically significant for the features of the claimed lens is not the absolute value, but the relative value of the optical phase at each point of the optical phase profile with respect to the remaining points, and the relative values of the optical phase at the different points of the phase profile remain the same after being shifted or normalized as claimed. Therefore, the issue of novelty of claim 1 does not depend on the mere fact of normalizing the predetermined value - let alone of normalizing it to zero or to any other arbitrary value -, but on the claimed feature that the mentioned first and second predetermined values have a common value within each sawtooth shape and that this common value is the same for all sawtooth shapes.

As regards the appellant's submissions based on the optical thickness profile represented in Fig. 3 (or, alternatively, in Fig. 10) of document D5, the board notes that the corresponding optical phase profile is not explicitly disclosed in document D5 but is - as

submitted by the appellant - proportional to the optical thickness profile shown in Fig. 3. Therefore, as it can be inferred from Fig. 3, the mentioned first and second predetermined values of the sawtooth shapes are different from each other within each sawtooth shape and, in addition, are not the same for all sawtooth shapes. The further submissions of the appellant according to which such optical phase profile could be normalized as shown, for instance, in plot "c)" represented on page 14 of the statement of grounds of appeal and obtained according to the appellant by a normalization of plot "a)" and it would therefore result in an optical phase profile as claimed do not convince the board. Plot "c)" is not obtained by normalization, i.e. by a shifting of the whole plot "a)", but by transforming plot "a)" into a different plot obtained by a deformation of portions of plot "a)" differently affecting each of the portions, the deformation being such that the series of minimum points of the profile having different values are all shifted to a common value equal to zero. This transformation of plot "a)", however, goes - as submitted by the respondent by reference to document A2, point 6 - beyond what the skilled person would understand by normalization of the values of plot "a)". In particular, while the normalization of an optical phase profile preserves - as mentioned in the former paragraph - the relative values of the optical phase of the points of the optical phase profile, the deformation of plot "a)" submitted by the appellant, i.e. plot "c)", represents a different optical phase profile than plot "a)" and has different technical characteristics as evidenced by a comparison of plots "b)" and "d)" showing the diffraction order efficiencies of the optical phase profiles of plots "a)" and "c)", respectively. In particular, the

efficiency value corresponding to the central peak of plot "d)" is significantly lower than that of the central peak of plot "b)", so that plots "b)" and "d)" represent - contrary to the appellant's submissions - the diffraction order efficiencies of different optical phase profiles and therefore of different diffractive lenses.

The further arguments submitted by the appellant by reference to the declaration D45 are not persuasive either. This declaration relates to what, in the appellant's view, had "been commonly used for many years", and also to what the skilled person, in the appellant's view, "would have" employed or adopted or done when implementing the disclosure of D5. More particularly, the reference in point 14 of the declaration to the claimed feature under consideration constituting "a trivial variation" implicitly acknowledges that the claimed feature is not disclosed in document D5. In any case, the arguments go beyond the assessment of novelty under Article 54(1) EPC and pertain to the issue of inventive step - which, in view of document D5 constituting, at the most, only state of the art within the meaning of Article 54(3) EPC, is not an issue to be considered in the present case (see Article 56, second sentence, EPC). Similar considerations apply to other arguments submitted by the appellant by reference to document D33 and based on the common general knowledge and the appellant's assertion that the lenses disclosed in document D5 achieved the same technical effects as the claimed lens.

- 6.1.3 Therefore, at least the features of claim 1 mentioned in point 6.1.2 above, second paragraph, are not directly and unambiguously derivable from document D5

and, under the assumption that document D5 constitutes state of the art within the meaning of Article 54(3) EPC (see point 6.1.1 above), the subject-matter of claim 1 is new over document D5 (Article 54(1) and (3) EPC).

6.2 Document D6

6.2.1 The appellant also submitted that the subject-matter of claim 1 was not new in view of document D6.

While the patent in suit has a filing date of 12 February 2010 and claims a priority of 12 February 2009, document D6 (filing date of 6 January 2009) is a European patent application the corresponding International application of which was published on 15 July 2010. It follows that, irrespective of whether the priority of the patent in suit was validly claimed, document D6 represents state of the art within the meaning of Article 54(3) EPC.

6.2.2 Document D6 discloses a diffractive multifocal lens having a radial surface profile (see Fig. 4 and 11) similar to the radial surface profile of the lens disclosed in document D5 and the content of document D6 is, for the present purposes, similar to that of document D5. Therefore, the same considerations in points 6.1.2 and 6.1.3 above also apply to the issue of novelty of the subject-matter of claim 1 over document D6.

It follows that the subject-matter of claim 1 is new over document D6 (Article 54(1) and (3) EPC).

6.3 No other objection of lack of novelty was raised by the appellant during the appeal proceedings.

The board concludes that the subject-matter of claim 1 and that of dependent claims 2 to 8 is new (Articles 52(1) and 54 EPC).

7. *Inventive step - Document D7 as closest prior art*

7.1 Distinguishing features

7.1.1 In its decision the opposition division held that the lens of claim 1 of the fourth auxiliary request then on file was new over the lens disclosed in document D7 by reference to Fig. 16 (see D7, paragraph bridging pages 11 and 12) in the feature requiring that the leading edge of the sharp peak of the sawtooth shape "rises from a first value normalized to zero" and the trailing edge of the sharp peak falls back "to the first value, wherein the first value is the same for each sawtooth shape". In the board's view the same finding applies to the corresponding features (1.10 and 1.11) of claim 1 of the present respondent's request.

7.1.2 The appellant disputed the opposition division's view in this respect and submitted in respect of claim 1 of the present respondent's request that the mentioned distinguishing feature was anticipated by document D7. The arguments submitted by the appellant in this respect are analogous to those submitted in respect of the issue of novelty of claim 1 over document D5 and, as already noted in points 6.1.2, in the board's view these arguments are not persuasive. In particular, the arguments submitted by the appellant by reference to the declaration D45 relate to what the skilled person, in the appellant's view, "would be expected to have done", and not to what the skilled person would

actually have done when implementing the lens shown in Fig. 16 of document D7 according to the actual disclosure of the document. The board also notes that the declaration D45 refers in point 25 to the feature under consideration as constituting "a minor adaptation" of the lens of document D7, thus implicitly acknowledging that the feature is not disclosed in document D7.

As regards the claimed feature relating to the concentric annular zones "having a projected surface area that is equal", the appellant submitted that this feature was disclosed in document D7 and that, in any case, the feature would be obvious in view of document E11. In the board's view this claimed feature is - as held by the opposition division in its decision - disclosed in document D7 in view of the values of the radii of the concentric annular zones disclosed in document D7, page 12, lines 4 to 6.

As regards the remaining claimed features, it was undisputed that these features - in particular, as submitted by the appellant by reference to document A1, feature 1.8 - are derivable from the disclosure of document D7 relating to the lens of Fig. 16.

7.1.3 Therefore, the lens defined in claim 1 is new over the lens disclosed in document D7 in the feature mentioned in point 7.1.1 above (Article 54(1) and (2) EPC).

7.2 Inventive step

7.2.1 According to the opposition division the objective technical problem solved by the distinguishing feature of claim 1 mentioned in point 7.1.1 above over the lens disclosed in document D7 as closest prior art was to be

seen in the provision of an alternative diffractive multifocal lens and, alternatively, in the provision of a multifocal lens which could be manufactured in an easier way.

The appellant and opponent 2 submitted that the patent specification was silent about the manufacturing characteristics of the claimed lens and that there was no evidence that the claimed lens was easier to manufacture than the lens of document D7. Therefore, the objective technical problem could only be seen in finding an alternative to the lens of document D7.

The respondent submitted that the claimed lens was, by virtue of the claimed distinguishing features, simpler to construct and that the objective technical problem resided in simplifying the construction of the diffractive multifocal lens.

The board notes that document D7 addresses the problem of simplifying the structure and design of diffractive multifocal lenses (page 3, first paragraph, and page 7, lines 21 to 23) and also the problem of an easy manufacture of the lenses (sentence bridging pages 6 and 7, and page 7, lines 19 to 21), and that the diffractive structure of the lens of Fig. 16 of document D7 is formed by locally changing the index of refraction of the lens by ion implantation (page 10, lines 15 and 16, and the paragraph bridging pages 11 and 12). In addition, as submitted by the appellant and opponent 2, the patent specification does not mention the manufacture of the claimed lens. However, in the board's view the skilled person would be aware that the distinguishing feature under consideration results in the claimed lens having a relatively simple structure - in particular, simpler than the structure

of the lens of Fig. 16 of document D7 - in that - as held by the opposition division in its decision - all the alternate steps of the concentric annular zones of the lens profile have a common reference base. In addition, this simpler structure of the lens simplifies in turn considerations relating to the manufacture of the lens and, in particular, simplifies the manufacture of the lens of document D7 by ion implantation in view of the common reference base. In view of these considerations, the board is of the opinion that the objective technical problem solved by the claimed diffractive multifocal lens resides in simplifying the structure of the lens of Fig. 16 of document D7, in particular in view of an easier manufacture of the lens.

7.2.2 The appellant submitted that the distinguishing feature under consideration was obvious in view of the common general knowledge in this technical field and referred in this respect to the prior art acknowledged in the patent specification by reference to Fig. 1 to 3, to paragraphs 24 and 25 of the declaration D45, and to documents D3, D10, D33 and D46. The appellant also submitted that there was no reason, in particular no disclosure in document D7, that would allow the conclusion that the skilled person would not consider using a common base line for all the peaks of the diffractive relief structure when implementing the lens of Fig. 16 of document D7.

The board first notes that Fig. 3 of the patent specification is disclosed as representing prior art and that it shows a phase profile with a repeating pattern of steps all having a common reference base; however, the pattern being repeated is constituted by one single step, and not by two steps having different

heights as it is the case of the lens of document D7. In addition, there is no evidence on file that a phase profile with a repeating pattern of two steps having different heights of the type disclosed in document D7 and having, in addition, a common reference base, i.e. a common lower value as claimed, pertained to the common general knowledge - let alone in the context of simplifying the manufacture of the lenses. In particular, to the extent that the patent documents D3 and D10 and the scientific article D33 are assumed to provide evidence of the common general knowledge (see Case Law, sections I.C.2.8.2 and I.C.2.8.3), neither document D3 (monofocal phase-zone lenses with a non-repeating pattern of steps having different heights, see Fig. 2 and 3) nor document D10 (a multifocal lens having a refractive Fresnel relief structure, see Fig. 1 and column 1, lines 30 to 35) nor document D33 (a diffractive lens with a pattern of steps all having the same height, see Fig. 1(b)) illustrate common general knowledge as recited above. In addition, document D46 is an excerpt from a textbook and the relief of each of the lenses disclosed in this document (Fig. 1.15, 1.17 and 10.6) is constituted by steps all having the same height or not arranged as a repeating pattern of two steps having different heights, and the same considerations above also apply to this document. It also follows from these considerations that the further allegation made by the appellant by reference to the declaration D45 (points 24 and 25) and according to which using a common lower value as claimed is something that the skilled person would be expected to have done in the lens of document D7 is not supported by the evidence on file.

In addition, contrary to the appellant's submissions, the pertinent question is not why the skilled person would not have considered providing a common base line for all the peaks of the lens of Fig. 16 of document D7, but - as submitted by the respondent - why the skilled person would have considered doing so.

- 7.3 In view of these considerations, the board concludes that the lens defined in claim 1 and, therefore, also those defined in dependent claims 2 to 8 involve an inventive step over document D7 as the closest prior art (Article 56 EPC) in combination with common general knowledge.
8. In view of the above considerations and conclusions, the board concludes that the patent as amended according to the present request of the respondent and the invention to which it relates meet the requirements of the EPC within the meaning of Article 101(3)(a) EPC.

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 as amended in the following version:
 - Claims: No. 1 to 8 according to the seventh auxiliary request filed with the letter of 12 January 2024.

- Description: Pages 1 to 12 according to the fourth auxiliary request filed during the oral proceedings before the opposition division on 28 April 2022.

- Drawings: Pages 11 to 14 of the patent specification.

The Registrar:

The Chairman:



L. Gabor

R. Bekkering

Decision electronically authenticated