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**Datasheet for the decision  
of 14 July 2023**

**Case Number:** T 1246/21 - 3.4.02

**Application Number:** 11741336.9

**Publication Number:** 2585861

**IPC:** G02B3/00, B42D15/00, G02B27/22,  
G02B3/04

**Language of the proceedings:** EN

**Title of invention:**

AN OPTICAL SYSTEM DEMONSTRATING IMPROVED RESISTANCE TO  
OPTICALLY DEGRADING EXTERNAL EFFECTS

**Patent Proprietor:**

Visual Physics, LLC

**Opponent:**

Giesecke+Devrient Currency Technology GmbH

**Relevant legal provisions:**

EPC Art. 100(c), 123(2), 56, 84  
RPBA 2020 Art. 12(6)

**Keyword:**

Grounds for opposition - subject-matter extends beyond content  
of earlier application (yes)  
Late-filed request - admitted (no)  
Amendments - extension beyond the content of the application  
as filed (yes)  
Inventive step - (no) - obvious combination of known features

**Decisions cited:**

**Catchword:**

Since Article 56 EPC and the final stage of the problem-solution approach both consider what is obvious to a person skilled in the art, an inventive step cannot be acknowledged solely on the finding that the claimed subject-matter is not directly and unambiguously disclosed from the combination of two documents.

In other words, when considering the question of whether an invention is obvious starting from a document representing the closest prior art in combination with another document, it is not the mere sum of the teachings of these two documents that has to be considered; the skilled person's common general knowledge and skills must also be taken into account when combining the two documents.



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Case Number: T 1246/21 - 3.4.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.02**  
**of 14 July 2023**

**Appellant:** Visual Physics, LLC  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 21 May 2021  
revoking European patent No. 2585861 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** R. Bekkering  
**Members:** C. Kallinger  
B. Müller

## **Summary of Facts and Submissions**

- I. The patent proprietor (appellant) appealed against the decision of the opposition division revoking European patent No. 2 585 861.
- II. The proprietor's main request was that the decision be set aside and that the opposition be rejected. As an auxiliary measure, the proprietor requested that the patent be maintained on the basis of claims according to one of the auxiliary requests filed with the statement of grounds of appeal.
- III. In its reply to the statement of grounds of appeal, the opponent (respondent) requested that the appeal be dismissed.
- IV. In this decision, reference will be made to the following documents:
- D2 US 7 333 268 B2  
D3 WO 2007/076952 A2
- V. In a communication pursuant to Article 15(1) RPBA 2020, the board presented its preliminary assessment.
- VI. Oral proceedings were held on 14 July 2023.
- VII. The parties' final requests were as follows:

The patent proprietor requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or that the decision under appeal be set aside and that the patent be maintained

in amended form on the basis of the claims according to one of a total of ten auxiliary requests labelled Main Request (a), Main Request (b), Auxiliary Request I, Auxiliary Request I(a), Auxiliary Request II, Auxiliary Request III, Auxiliary Request III(a), Auxiliary Request III(b), Auxiliary Request IV and Auxiliary Request IV(a), all of which were filed with the statement of grounds of appeal dated 29 September 2021.

The opponent requested that the appeal be dismissed.

VIII. Claim 1 of the patent as granted reads as follows (with feature numbering added by the board):

- 1a *A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*
- 1b *(a) one or more arrangements of image icons; and*
- 1c *(b) one or more totally embedded arrangements of image icon focusing elements,*
- 1d *wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons,*
- 1e *wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,*
- 1f *the system comprising in this order*
- 1g *an array of image icons;*
- 1h *an optical spacer;*

- 1i *an array of image icon focusing elements formed from a first material having a refractive index (n1); and*
- 1k *a second material having a different refractive index (n2) that fills interstitial spaces between and covers the focusing elements,*
- 1l *wherein the refractive index of the first material is less than the refractive index of the second material,*
- 1m *wherein the image icons are voids or recesses formed on or within a substrate,*
- 1n *wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth,*
- 1o *wherein the image icon focusing elements are concave lenses and*
- 1p *wherein the voids or recesses are optionally coated and/or filled.*

IX. Claim 1 of the first auxiliary request (labelled "Main Request (a)") is identical to claim 1 of the patent as granted.

X. Claim 1 of the second auxiliary request (labelled "Main Request (b)") reads as follows (with amendments over the patent as granted marked by the board):

*1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*

*(a) one or more arrangements of image icons; and*

*(b) one or more totally embedded arrangements of image icon focusing elements,*

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,

the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index ( $n_1$ ); and a second material having a different refractive index ( $n_2$ ) that fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.

XI. Claim 1 of the third auxiliary request (labelled "Auxiliary Request I") reads as follows (with amendments over the patent as granted marked by the board):

1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance

to optically degrading external effects, and which comprises:

(a) one or more arrangements of image icons; and

(b) one or more totally embedded arrangements of image icon focusing elements,

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,

the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index ( $n_1$ ); and a second material having a different refractive index ( $n_2$ ) that fills interstitial spaces between and covers the focusing elements, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.



XII. Claim 1 of the fourth auxiliary request (labelled "Auxiliary Request I(a)") reads as follows (with amendments over the patent as granted marked by the board):

*1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*

*(a) one or more arrangements of image icons; and*

*(b) one or more totally embedded arrangements of image icon focusing elements,*

*wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,*

*the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index (n1); and a second material having a different refractive index (n2) that fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high*

refractive index, colored or colorless material having a refractive index of more than 1.7,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.

XIII. Claim 1 of the fifth auxiliary request (labelled "Auxiliary Request II") reads as follows (with amendments over the patent as granted marked by the board):

1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:

(a) one or more arrangements of image icons; and

(b) one or more totally embedded arrangements of image icon focusing elements,

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,

*the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index (n1); and a second material having a different refractive index (n2) that fills interstitial spaces between and covers the focusing elements, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7, wherein the second material forms an outer boundary of both the arrangement(s) of image icon focusing elements and the arrangement(s) of image icons,*

*wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.*

XIV. Claim 1 of the sixth auxiliary request (labelled "Auxiliary Request III") reads as follows (with amendments over the patent as granted marked by the board):

*1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*

*(a) one or more arrangements of image icons; and*

*(b) one or more totally embedded arrangements of image icon focusing elements,*

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,

the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index ( $n_1$ ); and a second material having a different refractive index ( $n_2$ ) that fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7, wherein the second material forms an outer boundary of both the arrangement(s) of image icon focusing elements and the arrangement(s) of image icons,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.

XV. Claim 1 of the seventh auxiliary request (labelled "Auxiliary Request III (a)") reads as follows (with amendments over the patent as granted marked by the board):

*1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*

*(a) one or more arrangements of image icons; and*

*(b) one or more totally embedded arrangements of image icon focusing elements,*

*wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,*

*the system comprising in this order a second material; an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index (n1); the second material, and a wherein the second material having has a different refractive index (n2) that and the second material fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein*

the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7, wherein the second material forms an outer boundary of both the arrangement(s) of image icon focusing elements and the arrangement(s) of image icons,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.

XVI. Claim 1 of the eighth auxiliary request (labelled "Auxiliary Request III (b)") reads as follows (with amendments over the patent as granted marked by the board):

1. A system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:

(a) one or more arrangements of image icons; and

(b) one or more totally embedded arrangements of image icon focusing elements,

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by

ensuring that interfaces responsible for focus are embedded within the system,

the system comprising in this order a first layer of a second material; an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index (n1); and a second layer of the second material having, and wherein the second material has a different refractive index (n2) that and the second layer of the second material fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7, wherein the second material totally embeds the array of image icon focusing elements by forming an outer layer of the array of image icon focusing elements and covers or embeds the array of image icons, thereby encapsulating the system,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled.

XVII. Claim 1 of the ninth auxiliary request (labelled "Auxiliary Request IV") reads as follows (with amendments over the patent as granted marked by the board):

*1. A base platform made from a system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:*

*(a) one or more arrangements of image icons; and*

*(b) one or more totally embedded arrangements of image icon focusing elements,*

*wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,*

*the system comprising in this order an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index ( $n_1$ ); and a second material having a different refractive index ( $n_2$ ) that fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having*



a refractive index of more than 1.7, wherein the second material forms an outer boundary of both the arrangement(s) of image icon focusing elements and the arrangement(s) of image icons,

wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled,

wherein the first material has a refractive index ranging from about 1.35 to about 1.49.

XVIII. Claim 1 of the tenth auxiliary request (labelled "Auxiliary Request IV(a)") reads as follows (with amendments over claim 1 of the ninth auxiliary request marked by the board):

1. A base platform made from a system for projecting one or more synthetic optical images, which demonstrates improved resistance to optically degrading external effects, and which comprises:

(a) one or more arrangements of image icons; and

(b) one or more totally embedded arrangements of image icon focusing elements,

wherein the one or more arrangements of image icon focusing elements is disposed relative to the one or more arrangements of image icons such that at least a portion of the image icon focusing elements forms at least one synthetic image of at least a portion of the image icons, wherein the focal length(s) of the

*focusing elements in the system is locked in place by ensuring that interfaces responsible for focus are embedded within the system,*

*the system comprising in this order a first layer of a second material, an array of image icons; an optical spacer; an array of image icon focusing elements formed from a first material having a refractive index (n1); and a second layer of the a-second material, and wherein the second material~~having~~ has a different refractive index (n2) that and the second layer of the material fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and second materials, wherein the refractive index of the first material is less than the refractive index of the second material, wherein the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7, ~~wherein the second material forms an outer boundary of both the arrangement(s) of image icon focusing elements and the arrangement(s) of image icons~~ wherein the second material totally embeds the array of image icon focusing elements by forming an outer layer of the array of image icon focusing elements and covers or embeds the array of image icons, thereby encapsulating the system,*

*wherein the image icons are voids or recesses formed on or within a substrate, wherein the voids or recesses each measure from about 0.5 to about 8 microns in total depth, wherein the image icon focusing elements are concave lenses and wherein the voids or recesses are optionally coated and/or filled,*

*wherein the first material has a refractive index ranging from about 1.35 to about 1.49.*

## Reasons for the Decision

1. Main request - added subject matter (Article 100(c) EPC)
- 1.1 The opposition division found that the subject-matter of claim 1 extended beyond the content of the application as filed.
- 1.2 The opposition division and the opponent argued that features 1f, 1g, 1i and 1k of claim 1 as granted had a basis in the originally filed application documents (see claim 4 and paragraphs [0008] and [0012]). However, these features were only ever disclosed together with the further feature of *"a distinct interface being formed between the first and second materials"*. The omission of this restriction in claim 1 as granted was an unallowable intermediate generalisation as this feature was inextricably linked to the other limitations in features 1f, 1g, 1i and 1k.
- 1.3 The proprietor argued that claim 1 as granted defined *"image icon focusing elements formed from a first material"* and a second material that *"fills interstitial spaces between and covers the focusing elements"*. This would be understood by those skilled in the art as specifying systems in which the two materials are in direct physical contact and thus necessarily form a distinct interface between them. The above-cited features were explicitly disclosed in paragraph [0012] of the application as originally filed. The further information, i.e. *"a distinct interface being formed between the first and second materials"*, was merely a clarification and additional

explanation; not a feature that was inextricably linked to the preceding features.

The embodiment without a distinct interface (as described in paragraph [0016] of the application as originally filed) was not covered by claim 1, as a third, intermediate layer was excluded by the wording of this claim.

1.4 The board is not persuaded by the proprietor's arguments for the following reasons:

The application as originally filed clearly and explicitly distinguishes between two different embodiments for the focusing elements:

- A first embodiment having focusing elements formed of a first material and wherein a second material fills interstitial spaces between the focusing elements and/or covers the focusing elements, with a distinct interface formed between the two materials (see paragraph [0012] and originally filed claim 4).
- A second embodiment in which no distinct interface is formed but in which the two materials diffuse into each other, thereby forming gradient index lenses (GRIN) (see paragraph [0016] and originally filed claim 7).

Claim 1 has been amended to relate to the first of these embodiments and specifies that the image icon focusing elements are *"formed from a first material having a refractive index (n1); and a second material having a different refractive index (n2) that fills interstitial spaces between and covers the focusing elements"*. However, it does not explicitly specify an interface between the first and second materials, let alone a *"distinct interface"*.

With respect to the proprietor's argument that this restriction is implicitly present in claim 1, the board is of the following opinion:

Since claim 1 defines that the system "*comprises*" a number of components (see feature 1f,) it does not exclude further materials between the first and second materials.

Moreover, the expression "*formed from*" does not necessarily restrict the claimed structure to two materials with distinct interfaces, as this expression is also used to explain the formation of the focusing elements in the embodiment which explicitly rules out distinct interfaces (see paragraph [0016] of the application as originally filed).

Furthermore, the expression "*covers*" is not suitable for implicitly defining a distinct interface, as it does not require direct physical contact or exclude other layers between the second material and the first material.

The board therefore agrees with the opponent's argument that claim 1 also fails to implicitly define a "*distinct interface being formed between the first and second materials*".

The board also agrees with the opposition division and the opponent that features 1i and 1k in particular are inextricably linked to the other features of the first embodiment and in particular to the presence of a "*distinct interface being formed between the first and second materials*". The omission of this feature in granted claim 1 therefore constitutes an unallowable intermediate generalisation.

In conclusion, the subject-matter of claim 1 extends beyond the content of the application as filed (Article 100(c) EPC). The ground for opposition of Article 100(c) EPC therefore prejudices the maintenance of the patent as granted.

2. First auxiliary request (labelled "Main Request (a)") - admittance (Article 12(6) RPBA 2020)

2.1 The claims according to this request were first filed by the proprietor with its statement of grounds of appeal. Dependent claim 2 had been amended by the deletion of the first alternative, which specified that *"the first material is a high refractive index [...] material having a refractive index of more than 1.7"*.

2.2 The proprietor argued that this request was filed in response to the decision of the opposition division in respect of claim 1 and in view of the objection raised against claim 2 (see the statement of grounds of appeal, point 2.4). Since this objection, and particularly its reasoning, was surprising and contradictory, filing this request with the statement of grounds of appeal was the earliest possible opportunity.

In addition, the deletion of the first alternative of dependent claim 2 was not complex and completely overcame the issue at hand.

Finally, admitting this auxiliary request into the proceedings would not be detrimental to procedural economy because if the objection under Article 123(2) EPC against claim 1 of the main request (patent as granted) is found convincing, then the first auxiliary

request (labelled "Main Request (a)") would not fulfill the requirement of Article 123(2) EPC either and would therefore no longer need to be discussed.

Therefore, the request should be admitted into the proceedings.

- 2.3 The opponent requested that this request not be admitted into the appeal proceedings because the amendment to dependent claim 2 could and should have been filed during the first-instance opposition proceedings.

Furthermore, claim 1 of this request was not amended and therefore the same objections as for claim 1 of the patent as granted applied.

- 2.4 The board agrees with the opponent's argument that the first auxiliary request should not be admitted into the appeal proceedings.

First, the amendment is not a response to the decision of the opposition division in respect of claim 1 since claim 1 was not amended.

Furthermore, as claim 1 was not amended, the board is of the opinion that the amendment does not address the objection under Article 100(c) EPC against independent claim 1.

Finally, the decision with respect to dependent claim 2 cannot have come as a surprise to the proprietor since the opposition division had already discussed this objection in its summons to oral proceedings dated 14 August 2020 (see point 3.1.2).

The board is therefore of the opinion that this request could and should have been filed during the first-instance opposition proceedings and, as a consequence, is not to be admitted into the proceedings pursuant to Article 12(6) RPBA 2020.

3. Second auxiliary request (labelled "Main Request (b)")  
- inventive step (Article 56 EPC)

3.1 Amendments

Feature 1k of claim 1 has been supplemented as follows  
*"a second material having a different refractive index (n2) that fills interstitial spaces between and covers the focusing elements, a distinct interface being formed between the first and the second materials".*

This feature will be referred to as feature 1k' in the following.

3.2 Closest prior art and distinguishing features

It was undisputed that document D3 could be considered the closest prior art for the assessment of inventive step under the problem-solution approach.

3.2.1 The opposition division found that document D3 did not disclose that the image icons were voids or recesses formed on or within a substrate, the voids or recesses each measuring from about 0.5 to about 8 microns in total depth (features 1m and 1n).

3.2.2 The proprietor argued that not only did document D3 not disclose features 1m and 1n, it did not disclose (implicitly or explicitly) feature 1k' either. D3 (see page 14, lines 4 to 19) only disclosed a layer for



protecting the lenses ("*Schutzschicht*") and specified that if the refractive index of the protective layer was higher than the refractive index of the lenses, concave lenses were formed. However, no further information was given as to whether the protective layer actually filled the interstitial spaces between the lenses or formed a distinct interface with the focusing elements. In other words, the disclosure of D3 was merely a generic disclosure of a protective layer, without the specific properties of the layer as defined in feature 1k' of claim 1.

These properties of the protective layer were not implicitly disclosed in D3 either, since in the case of concave lenses, the interstitial spaces were formed by elevated structures between the focusing elements and it would be sufficient for the protective layer to cover only the focusing elements, i.e. to fill only the valleys forming the concave lenses.

Furthermore, an intermediate layer between the focusing elements and the protective layer was not ruled out by the disclosure of D3, as has also been discussed with respect to the objection under Article 100 c) EPC against claim 1 of the main request.

In conclusion, the mere disclosure of a layer protecting the concave focusing elements was "*neither [a] direct nor unambiguous disclosure for the interstitial spaces [...] being also covered by the protective layer disclosed by document D3*" (see the statement of grounds of appeal, point 2.6.1 a) on page 9).

3.2.3 The board agrees with the proprietor's arguments and is of the opinion that in addition to not disclosing

features 1m and 1n, document D3 does not directly and unambiguously disclose feature 1k' either.

3.3 Technical effect and problem to be solved

3.3.1 The opposition division found that starting from document D3 as the closest prior art, the problem could be regarded as finding an alternative for the image icons with increased resolution.

3.3.2 The opponent agreed to this formulation of the problem (see the reply to the statement of grounds of appeal, point D.4.2)

3.3.3 The proprietor also agreed with this problem but argued that in addition, amended feature 1k' improved the protection of the image icon focusing elements against environmental influences and also against counterfeiting (see the statement of grounds of appeal, point 2.6.1 d).

3.3.4 The board agrees with the objective technical problem as formulated by the opposition division.

With respect to the alleged additional improvement provided by amended feature 1k', the board refers to the discussion of obviousness below.

### 3.4 Obviousness

The two distinguishing features as identified above, i.e.

- the formation of the image icons as voids or recesses and the dimensions thereof (features 1m and 1n)
- the second material filling the interstitial spaces between and covering the focusing elements and a distinct interface being formed between the first and the second materials (feature 1k')

constitute the basis for the examination of obviousness.

#### 3.4.1 Image icons as recesses (features 1m and 1n)

The opposition division and the opponent argued that starting from document D3, the person skilled in the art attempting to solve the objective problem identified above would turn to document D2 and learn that forming the image icons as voids or recesses has the *"benefit of almost unlimited spatial resolution"* (see column 16, lines 7 to 14, and Figure 7c). The skilled person would thus be motivated to replace the printed structures of D3 with the microstructured voids of Figure 7c of D2 (feature 1m). In addition, D2 also disclosed (see column 26, lines 45 to 54, and claims 65 and 66 ) that such recesses of a microstructure preferably have a depth of 0.5 to 8 microns (feature 1n).

The proprietor did not contest this finding.

### 3.4.2 Properties of the second material (feature 1k')

As discussed above, D3 discloses a protective layer but does not directly and unambiguously disclose that this layer, which fills the interstitial spaces between the focusing elements, covers the focusing elements and forms a distinct interface with the first material.

The board agrees with the opponent's line of argument that D3 (see page 14, lines 4 to 19) explicitly discloses a protective layer ("*Schutzschicht*") in order to protect the image icon focusing elements against environmental influences and also against counterfeiting ("*Schutz vor Umwelteinflüssen*" and "*verhindert [...] dass sich die Mikrofokussierelement-Anordnung zu Fälschungszwecken leicht abformen lässt*"). The person skilled in the art inevitably has to consider how the protective layer known from D3 should be realised and in order to achieve a good level of protection, they would realise the protective layer as a layer filling the interstitial spaces between and covering the focusing elements. In view of the required relationship between the refractive indices and in the absence of any teaching to the contrary, this layer would necessarily be formed without an additional intermediate layer and would therefore also form a distinct interface with the first material.

## 3.5 Application of the problem-solution approach

3.5.1 The proprietor argued that in strict application of the problem-solution approach, the skilled person combining the teaching of document D3 with that of D2 would arrive in a straightforward manner only at the provision of a protective layer over the focusing elements (as known from D3).

However, this was not what was claimed because there was no indication in either D2 or D3 or a combination thereof to use a protective layer which covers the focusing elements and also fills the interstitial spaces between them. Arriving at this feature clearly involved hindsight.

The proprietor further argued that instead of applying the established problem-solution approach, the opponent and the opposition division's line of argument was that when starting from the combination of D3 with D2, the skilled person would be confronted with the task of selecting a material for the sealing material layer for the image icons and that it would then be obvious to the person skilled in the art to choose a material that was already used in the system for the same purpose. However, this was not what the problem-solution approach required and was detrimental to the evaluation of the presence of an inventive step according to established case law.

In conclusion, when the problem-solution approach was correctly applied, the subject-matter of claim 1 of the second auxiliary request involved an inventive step over the available prior art.

3.5.2 The board is not convinced by the proprietor's line of argument for the following reasons:

With respect to a combination of two documents, the proprietor argued that for some of the claimed features the documents provided no *"direct and unambiguous disclosure"* (see the letter dated 23 June 2023, point 2.2) and that *"[a]ccording to the problem-solution approach, if there is any remaining*

*feature not taught by this combination, the subject-matter claimed has to be acknowledged to involve an inventive step"* (see the letter dated 23 June 2023, point 4.3).

The board does not agree with this application of the problem-solution approach for the following reasons:

In the fourth and final stage of the problem-solution approach (see Case Law of the Boards of Appeal, 2020 edition, I.D.2) it is considered "*whether or not the claimed solution, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person*". This stage is most closely related to the requirement of Article 56 EPC, according to which "*[a]n invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art*".

Since Article 56 EPC and the final stage of the problem-solution approach both consider what is obvious to a person skilled in the art, an inventive step cannot be acknowledged solely on the finding that the claimed subject-matter is not directly and unambiguously disclosed from the combination of two documents.

In other words, when considering the question of whether an invention is obvious starting from a document representing the closest prior art in combination with another document, it is not the mere sum of the teachings of these two documents that has to be considered; the skilled person's common general knowledge and skills must also be taken into account when combining the two documents.

3.5.3 In the case at hand, D3 does not disclose that the protective layer (which, according to claim 1, is represented by the second material) fills interstitial spaces between and covers the focusing elements and forms a distinct interface between the first and the second materials, as discussed above.

However, the board agrees with the opponent that for the person skilled in the art considering the specific implementation of the protective layer taught by D3 it would be obvious not only to fill the concave parts of the lenses with material but also to cover the spaces between them in order to provide sufficient protection for the focusing elements. Otherwise, the boundaries between the filled portions and the protrusions would act as points of attack for harmful environmental conditions, as would be readily apparent to the skilled person.

In addition, in view of the required relationship between the refractive indices, it would be clear to the skilled person that the protective layer would necessarily have to be formed without an additional intermediate layer and would therefore also form a distinct interface with the first material.

3.5.4 In conclusion, the board is of the opinion that the subject-matter of claim 1 does not involve an inventive step starting from D3 in view of D2.

4. Third auxiliary request (labelled "Auxiliary Request I") - added subject matter (Article 123(2) EPC)

Claim 1 of this request does not contain the feature objected to above, i.e. *"a distinct interface being formed between the first and the second materials"*.

For the same reasons as set out above in relation to the main request, the board is of the opinion that the omission of this feature constitutes an unallowable intermediate generalisation.

Therefore, the subject-matter of claim 1 of this request extends beyond the content of the application as filed and consequently fails to comply with Article 123(2) EPC.

5. Fourth auxiliary request (labelled "Auxiliary Request I(a)") - inventive step (Article 56 EPC)

- 5.1 Amendments

Compared to claim 1 as granted, claim 1 of this request contains the additional restriction of *"a distinct interface being formed between the first and the second materials"*.

In addition, the second alternative of dependent claim 2 has been added, i.e. the specification that *"the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7"*.



5.2 Inventive step

5.2.1 With respect to the added feature defining that *"the second material is a high refractive index, colored or colorless material having a refractive index of more than 1.7"*, the opposition division and the opponent argued that this was known from document D3, which disclosed that the second material had a refractive index between 1.7 and 2 (see page 14, lines 13 to 17).

5.2.2 The proprietor did not contest this finding (see the statement of grounds of appeal, point 3.2). It argued again that document D3 did not disclose feature 1k', and that therefore the claimed subject-matter was based on an inventive step.

5.2.3 The board agrees with the opposition division and the opponent and is of the opinion that document D3 discloses the specific refractive index now claimed.

Therefore, for the same reasons as set out above for the second auxiliary request (see point 3 above), the board is of the opinion that the subject-matter of claim 1 does not involve an inventive step (Article 56 EPC) starting from document D3 in view of document D2.

6. Fifth auxiliary request (labelled "Auxiliary Request II") - added subject matter (Article 123(2) EPC)

Claim 1 of this request does not contain the feature objected to above, i.e. *"a distinct interface being formed between the first and the second materials"*.

For the same reasons as set out above in relation to the main request, the board is of the opinion that the omission of this feature constitutes an unallowable intermediate generalisation.

Therefore, the subject-matter of claim 1 of this request extends beyond the content of the application as filed and consequently fails to comply with Article 123(2) EPC.

7. Sixth auxiliary request (labelled "Auxiliary Request III") - added subject-matter (Article 123(2) EPC)

7.1 Amendments

Compared to claim 1 of the fourth auxiliary request, this request contains the additional restriction that *"the second material forms an outer boundary of both arrangement(s) of image icon focusing elements and the arrangement(s) of image icons"*.

7.2 Added subject-matter

7.2.1 The opponent argued that the amendment constituted an unallowable intermediate generalisation because the added feature was disclosed in the description as originally filed only in connection with a *"total encapsulation of the system"* (see paragraphs [0008], [0012] and [0043]).

7.2.2 The proprietor argued that the skilled person would interpret the added feature that *"the second material forms an outer boundary of both arrangement(s) of image icon focusing elements and the arrangement(s) of image*

*icons*" such that the second material is not only provided between the environment and the image icon focusing elements (in order to thereby form the outer boundary for the image icon focusing elements) but also between the environment and the image icons in order to thereby form an outer boundary also for the image icons. To this end, the second material necessarily had to be provided on both sides of the system, i.e. above the image icon focusing elements and below the image icons.

This interpretation was consistent with the skilled person's common general knowledge as well as the originally filed application (see description, paragraph [0012] and Figure 2).

Thus, when interpreting the subject-matter of claim 1, the skilled person inevitably arrived at the conclusion that the added feature automatically provided a total encapsulation of the system.

7.2.3 The board is not convinced by the proprietor's arguments for the following reasons:

The board agrees with the opposition division's interpretation that the feature that the second material forms an "outer boundary" of both the arrangement of image icons and the arrangement of image icon focusing elements is already realised when the second material is provided on the upper surface of the image icon focusing elements.

Therefore, in the present form, the claim also includes embodiments in which the second material forms only an upper outer boundary, in which case the system is not encapsulated.

In conclusion, the board is of the opinion that the added limitation that "*the second material forms an outer boundary of both arrangement(s) of image icon focusing elements and the arrangement(s) or image icons*" is only disclosed together with the further limitation that it thereby encapsulates the system. The omission of the latter limitation in the claim therefore constitutes an unallowable intermediate generalisation.

Thus, the subject-matter of claim 1 extends beyond the content of the application as filed and consequently fails to comply with Article 123(2) EPC.

8. Seventh auxiliary request (labelled "Auxiliary Request III(a)") - added subject matter (Article 123(2) EPC) and clarity (Article 84 EPC)

8.1 Amendments

Compared to claim 1 of auxiliary request 3, in this request feature 1k was amended as follows:

- 1f     *the system comprising in this order*  
1k'    *a second material*  
1g     *an array of image icons;*  
1h     *an optical spacer;*  
1i     *an array of image icon focusing elements formed from a first material having a refractive index (n1); and*  
1k''   *the second material, and a*

1k wherein the second material ~~having~~has a different refractive index (n2) ~~that~~and the second material fills interstitial spaces between and covers the focusing elements,

## 8.2 Added subject-matter

For the same reasons as discussed above for the sixth auxiliary request, the board is of the opinion that the additional limitation that "*the second material forms an outer boundary of both arrangement(s) of image icon focusing elements and the arrangement(s) or image icons*" is only disclosed together with the further limitation that it thereby encapsulates the system. The omission of the latter limitation in the claim constitutes an unallowable intermediate generalisation.

Therefore, the subject-matter of claim 1 extends beyond the content of the application as filed and consequently fails to comply with Article 123(2) EPC.

## 8.3 Clarity

8.3.1 The opposition division found that amended claim 1 was not clear because in the amended claim the second material appeared twice in the sequence of layers, once as a first layer next to the image icons and a second time covering the image icon focusing elements. However, the second occurrence was introduced with the definite article, i.e. as a reference to the first occurrence. It was thus not clear to which entity the definition of an outer boundary referred to and whether there were really two layers of the same second material.

8.3.2 The proprietor argued that it was immediately apparent to the skilled person that the feature "*the system comprising in this order...*" constituted an enumeration of layers that were provided in the order specified by this feature.

The skilled person thus necessarily arrived at the understanding that there were two layers of the second material, one below the array of image icons and one above the array of image icon focusing elements.

The skilled person would not arrive at any other interpretation, and therefore the objection under Article 84 EPC was not convincing.

8.3.3 The board is not convinced by the proprietor's arguments; it agrees with the opponent's reasoning.

The claim defines "*a second material*" in feature 1k' and refers again to "*the second material*" in feature 1k''. It is not clear how it is possible for the same second material to appear twice in the claimed sequence of layers. In addition, feature 1k further defines "*the second material*". It is not clear whether and how the limitations set out in feature 1k apply to both occurrences of the second material.

The board is therefore of the opinion that amended claim 1 is not clear (Article 84 EPC).

9. Eighth auxiliary request (labelled "Auxiliary Request III(b)") - inventive step (Article 56 EPC)

9.1 Amendments

In comparison to claim 1 of the fourth auxiliary request, claim 1 of this request additionally defines first and second layers of the second material and that *"the second material totally embeds the array of image icon focusing elements by forming an outer layer of the array of image icon focusing elements and covers or embeds the array of image icons, thereby encapsulating the system."*

9.2 Inventive step

9.2.1 The opposition division found that document D2 (see column 35, lines 9 to 25) taught covering the voids or recesses with a sealing layer. In addition, the skilled person would choose the same material to cover the image icons and the focusing elements in order to simplify the manufacturing process.

As the added features were also obvious to the skilled person, the subject-matter of claim 1 did not involve an inventive step starting from document D3 in view of document D2.

9.2.2 The proprietor argued that although D2 taught the use of a sealing layer to seal the image icons, neither document D2 nor document D3 disclosed the use of the same material to cover the image icons and the image icon focusing elements.

Furthermore, when combining documents D3 and D2, the skilled person would not find any incentive to use the

same material for the sealing layer of the image icons as that used to cover the focusing elements.

Moreover, the use of the same material to encapsulate the system increased resistance to counterfeiting, as there were no material transitions around the outer boundary.

Finally, in contrast to the established problem-solution approach, the opponent's objection of a lack of inventive step was based on more than the combination of two documents.

In conclusion, the subject-matter of claim 1 was based on an inventive step.

9.2.3 The opponent argued that D3 explicitly disclosed the use of a high refractive index material for the layer covering the focusing elements. In order to provide an efficient manufacturing process, it was obvious to the skilled person to choose the same material also for the layer covering the image icons. Therefore, for the same reasons as set out for the fourth auxiliary request, the subject-matter of claim 1 did not involve an inventive step starting from document D3 in view of document D2.

9.2.4 The board agrees with the arguments of the opposition division and the opponent. Starting from document D3, the skilled person learns from document D2 that the image icons can be realised by means of voids formed in a substrate and that a sealing layer can be applied (see column 35, lines 14 to 25).

As discussed above (see point 3.5), the skilled person's common general knowledge must also be taken



into account when considering the question of whether an invention is obvious starting from a document representing the closest prior art and combining it with another document.

Therefore, when faced with the task of selecting a material for the sealing layer for the image icons known from document D2, it would be obvious for the person skilled in the art to choose a material that is already used in the system for the same purpose, i.e. to protect the system against environmental influences. To this end, D3 proposes a material with a high refractive index for the upper protective layer (see page 14, lines 14 to 19).

Hence, it would be obvious to the person skilled in the art to use the high refractive index material used in D3 also for the sealing layer for the image icons suggested in D2.

In conclusion, the board is of the opinion that the subject-matter of claim 1 does not involve an inventive step starting from D3 in view of D2.

10. Ninth auxiliary request (labelled "Auxiliary Request IV") - added subject-matter (Article 123(2) EPC)

Claim 1 again comprises the feature that "*the second material forms an outer boundary of both arrangement(s) of image icon focusing elements and the arrangement(s) or image icons*".

For the same reasons as set out above in relation to the sixth auxiliary request, the board is of the

opinion that this feature is only disclosed together with the further limitation that it thereby encapsulates the system. The omission of this feature from claim 1 constitutes an unallowable intermediate generalisation.

Therefore, the subject-matter of claim 1 of this request extends beyond the content of the application as filed and consequently fails to comply with Article 123(2) EPC.

11. Tenth auxiliary request (labelled "Auxiliary Request IV(a)") - inventive step (Article 56 EPC)

11.1 Amendments

Compared to claim 1 of the sixth auxiliary request, claim 1 was amended to refer to a *"base platform made from a system..."*, with the additional restriction that *"the first material has a refractive index ranging from about 1.35 to about 1.49."*

11.2 Inventive step

11.2.1 With respect to inventive step, the proprietor did not submit any additional arguments; it simply referred to the arguments submitted for the preceding auxiliary requests (see the statement of grounds of appeal, point 8, and the letter of the proprietor dated 29 September 2022, point 10).

11.2.2 The opposition division found that the additional feature of a *"base platform"* was present in documents D2 and D3 since these systems could all be regarded as

forming a base platform (see, for example, D2, column 36, lines 24 to 33, or D3, page 14, lines 21 to 23).

Furthermore, D3 (see page 14, line 14) disclosed a refractive index for the first material with a lower refractive index in the range of 1.2 to 1.5. Since the upper limit of 1.5 could still be considered as "about 1.49", this feature could be regarded as being disclosed in D3.

- 11.2.3 The board agrees with the opposition division that the features added in comparison to the eighth auxiliary request are disclosed in documents D2 and D3.

Therefore, for the same reasons as set out above for the eighth auxiliary request (see point 9.2.4), the subject-matter of claim 1 does not involve an inventive step starting from D3 in view of D2.

## **Order**

### **For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



L. Gabor

R. Bekkering

Decision electronically authenticated



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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**Case Number: T 1246/21 - 3.4.02**

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.02**  
**of 21 November 2023**  
**correcting an error in the decision**  
**of 14 July 2023**

**Appellant:**  
(Patent Proprietor)

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**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 21 May 2021  
revoking European patent No. 2585861 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman:** R. Bekkering  
**Members:** C. Kallinger  
B. Müller

According to Rule 140 EPC obvious mistakes in a decision may be corrected. The reasoning of the decision of 14 July 2023 contains an obvious mistake in the fourth paragraph on page 27.

The fourth paragraph on page 27 in section 3.5.2 of the decision shall read (correction marked by the board) :

*Since Article 56 EPC and the final stage of the problem-solution approach both consider what is obvious to a person skilled in the art, an inventive step cannot be ~~denied~~ acknowledged solely on the finding that the claimed subject-matter is not directly and unambiguously disclosed from the combination of two documents.*

The Registrar:

The Chairman:



L. Gabor

R. Bekkering

Decision electronically authenticated