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**Datasheet for the decision
of 20 February 2019**

Case Number: T 1763/14 - 3.2.05

Application Number: 02721837.9

Publication Number: 1417517

IPC: B42D15/00, B42D25/00, B41M3/14,
B44F1/10, B41M3/06, G02B5/18

Language of the proceedings: EN

Title of invention:
An optical device and methods of manufacture

Patent Proprietor:
CCL Secure Pty Ltd

Opponent:
Giesecke+Devrient GmbH

Relevant legal provisions:
EPC 1973 Art. 56
EPC Art. 123(2)
RPBA Art. 12(4), 13(1)

Keyword:

Added matter (yes: main request)

Admissibility of the auxiliary requests (no: auxiliary requests 1 to 5 and 7; yes: auxiliary request 6)

Reformatio in peius (no)

Inventive step (yes: auxiliary request 6)



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Case Number: T 1763/14 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 20 February 2019

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted
on 8 July 2014 concerning the maintenance of
European patent No. 1417517 in amended form.**

Composition of the Board:

Chairman M. Poock
Members: O. Randl
J. Geschwind

Summary of Facts and Submissions

- I. The opponent filed an appeal against the interlocutory decision of the opposition division on the amended form in which European patent No. 1 417 517 could be maintained.

The opposition division was of the opinion that the main request on file did not comply with the requirements of Article 123(2) EPC but that the first auxiliary request was allowable.

- II. Among the documents considered by the opposition division, the following are relevant for the appeal proceedings:

D2: WO 98/20382 A1;
D9: EP 0 375 833 A1.

Together with its statement of grounds of appeal, the appellant also filed document WO 98/08131 A1, which it referred to as document "D11". As the opposition division used this reference for a different element of the state of the art, the board will refer to this document as "D12".

- III. The oral proceedings before the board took place on 20 February 2019.
- IV. The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed (main request) or that the decision be set aside and the patent be maintained on the basis of one of auxiliary requests 1 to 3 filed with the

response to the statement of grounds of appeal, or auxiliary requests 4 to 7 filed with its letter of 19 December 2018.

- V. Claims 1 and 11 of the main request read as follows (the feature references used by the board are indicated in square brackets):

"1. [1-1] A method of manufacturing an optical device which generates an optically variable image, the image being optically variable in that it varies according to the position of observation, the method including the steps of:

[1-2] dividing an optically invariable image into multiple pixels;

[1-3] determining colour component values for each pixel;

[1-4] for each of the pixels of the optically invariable image, determining an associated pixel surface structure which has a three-dimensional surface shape and curvature [1-5] which is related via a mathematical or computer algorithm to the colour component values of the associated pixel in the optically invariable image, [1-6] each pixel surface structure being an individual zero order reflective optic surface microstructure which produces an observable optical effect; and

[1-7] producing an assembly of the zero order reflective optic pixel surface microstructures which, when illuminated generates a plurality of observable optical effects which combine to form an optically variable reproduction of the optically invariable image."

"11. [11-1] An optical device providing an optically variable image, [11-2] corresponding to an optically

invariable counterpart image, the optical device including [11-3] a pixellated reflective structure which is [11-4] an assembly of zero order reflective optic surface relief pixels wherein [11-5] the optical device when illuminated generates the optically variable image, the image being optically variable in that it varies according to the position of observation, wherein [11-6] each of the zero order reflective optic surface relief pixels is an individual zero order reflective optic surface microstructure which [11-7] has a three-dimensional surface shape and curvature [11-8] which is related by a mathematical or computer algorithm to colour component values of an associated pixel in the optically invariable counterpart image, and wherein [11-9] the optically variability is produced by differing angular orientations of the individual zero order reflective optic surface relief pixels."

Claim 1 of the first auxiliary request is identical to claim 1 of the main request.

Claim 11 of the first auxiliary request differs from claim 11 of the main request in that "optically variability" has been replaced by "optical variability".

Claim 1 of the second auxiliary request is identical to claim 1 of the main request.

Claim 11 of the second auxiliary request differs from claim 11 of the first auxiliary request by the insertion of commas before and after "when illuminated" and by the additional feature "and wherein, [11-10] when illuminated, the zero order reflective optic surface microstructures generate a plurality of

observable optical effects which combine to form an optically variable reproduction of the optically invariable image".

Claims 1 and 11 of the third auxiliary request differ from claims 1 and 11 of the second auxiliary request by the insertion of "of dimensions 30 microns x 30 microns or less" after "individual zero order reflective optic surface microstructure"

Claim 1 of the fourth auxiliary request is identical to claim 1 of the first auxiliary request.

Claim 11 of the fourth auxiliary request differs from claim 11 of the first auxiliary request in that the expression "An optical device" has been replaced by "A system comprising: an optical device" and the feature "and the optically invariable counterpart image" has been added at the end of the claim.

Claim 1 of the fifth auxiliary request is identical to claim 1 of the fourth auxiliary request.

Claim 11 of the fifth auxiliary request differs from claim 11 of the fourth auxiliary request in that the feature "wherein the optically invariable counterpart image is stored in a memory of a computer" has been added at the end of the claim.

The claims of the sixth auxiliary request are identical to claims 1 to 10 of the first auxiliary request.

Claim 1 of the seventh auxiliary request differs from claim 1 of the third auxiliary request in that the features "wherein the colour component values are represented in each pixel surface structure by a degree

of the curvature and surface slope directions of the corresponding zero order reflective optic surface microstructure, wherein the colour component values of the associated pixel in the optically invariable image are RGB colour components, and wherein a surface of the corresponding zero order reflective optic surface microstructure is given by $Z = (R/255)Y + (G/255)(X^2 + (B/255)Y^2)$, where X, Y and Z are Cartesian coordinates" have been inserted.

Claim 11 of the seventh auxiliary request differs from claim 11 of the third auxiliary request in that the features "wherein the colour component values are represented in each zero order reflective optic surface relief pixel by a degree of the curvature and surface slope directions of the corresponding zero order reflective optic surface microstructure, wherein the represented colour component values are RGB colour components, and wherein a surface of the corresponding zero order reflective optic surface microstructure is given by $Z = (R/255)Y + (G/255)(X^2 + (B/255)Y^2)$, where X, Y and Z are Cartesian coordinates" have been inserted.

VI. The appellant argued as follows:

(a) Inadmissible extension

Claim 11 has been inadmissibly extended by the insertion of feature 11-7. The resulting combination of features has no basis in the original application.

Original independent claim 1 refers to a pixel surface structure having a 3D surface shape and curvature (see page 12, line 8) that create the optical effects (see page 12, lines 15 and 16). Original independent

claim 11 discloses that there are surface relief pixels, but "the optically variability is produced by differing angular orientations of the individual reflective surface relief pixels" (see page 16, lines 7 and 8). Original independent claim 13 claims an individual reflecting or diffracting three-dimensional surface structure (see page 16, lines 21 and 22). Dependent claim 22 referred to "claim 11 or claim 13" and required "the angles of inclination of the pixel mirror elements [to] vary throughout the device to produce an optically variable image upon illumination of the device" (see page 18, lines 4 to 6). Thus, the claims cover several variants that correspond to the different aspects mentioned in the description ("first aspect": page 4, line 27; "second aspect": page 5, line 9; "third aspect": page 5, line 18; "fourth aspect": page 5, line 28). There is no disclosure that the different aspects of the invention can be combined. The respondent has referred to page 8, line 7, where the surface slope direction and degree of curvature are determined for each pixel. It is not clear what is meant by surface slope direction: are there different curvatures in different directions? On page 7, lines 19 and 20 a predetermined angle and curvature properties are mentioned. Thus, the application discloses several variants: surface shape and curvature (claim 1), differing angular orientations (claim 11), 3D surface structure (claim 13) and surface slope directions (page 8). There is no disclosure that would justify introducing the feature "3D surface shape and curvature" of claim 1 into claim 11. In claim 11 as amended, the pixels has a 3D surface shape and curvature, but the optical variability is produced by differing angular orientations. This combination is not disclosed in the original application.

(b) Admissibility of the auxiliary requests

The first, second and third auxiliary requests are inadmissible, because they could have been filed before the opposition division. All contain amendments that were either not present in the first instance claims or had not been pursued by the patent proprietor. Auxiliary requests 4 to 7 cannot be said to constitute a response to the board's communication, because the objection that feature 11-8 was not structurally limiting the claimed subject-matter had been formulated by the opponent in its statement of ground of appeal (dated 5 November 2014). The patent proprietor had filed requests in response to this objection, but the sixth auxiliary request was not filed at that time. The auxiliary requests had been filed as late as possible, which results in the proceedings being delayed (need for a new search). Moreover, the description has not been adapted. It should also be noted that the auxiliary requests diverge: there are four different lines of defence.

When the board declared that it intended to admit the sixth auxiliary request, the appellant pointed out that the patent proprietor had not filed an appeal and that, therefore, it should not be able to improve its position in the appeal proceedings. Notwithstanding this, the respondent has improved its position by deleting all the device claims. This should not be allowed. When asked by the board how the appellant had been disadvantaged by the deletion of the product claims, the appellant explained that requests had to be considered as a whole. The respondent's way of proceeding amounted to twofold cherry-picking: not only has it filed divergent requests, but it has also deleted a whole category of claims.

(c) Sixth auxiliary request: inventive step

Claim 1 lacks inventive step in view of the disclosure of documents D12 and D9, or D2 and D9, in combination.

(i) Starting from document D12

Document D12 was filed together with the statement of grounds of appeal and should be admitted because it was highly relevant.

Document D12 discloses a method of manufacturing an optical device which generates an optically variable image (page 6, lines 18-24). The device is reflective (see claim 1 and Figs. 1 and 2). The fact that there are pixels can be seen from Fig. 3 (references SP1, SP2, etc.). As the device operates in reflection mode, its pixels form ZORO devices. The 3D curvature of the pixel surface structure is disclosed in Fig. 6.

The only feature that is not disclosed in document D12 is the determination of colour component values for each pixel (feature 1-3) and their use for the establishment of the associated pixel surface structure (feature 1-5). In other words, the only missing element is the reference to colour.

The objective technical problem is to provide a method of manufacturing an optical device generating an optically variable image in which the underlying optically invariable image can be a coloured image.

Document D9 discloses an optically variable pattern based on diffraction (otherwise it would anticipate the subject-matter of claim 1), but this would not deter

the skilled person. There is a clear disclosure that the pixels are selected as a function of the colour values (see col. 4, lines 37 to 39; col. 8, lines 28 to 35). Claim 1 encompasses this case; it does not exclude the possibility that all the colour component values are identical. Those skilled in the art are taught that they can determine pixel parameters as a function of their colour values. This teaching leads them in an obvious way to the subject-matter of claim 1.

It is not correct that document D9 does not relate to stereographic pictures; see col. 6, lines 49 and 50.

The pieces of information ("Informationen") referred to in col. 8, lines 36 to 40, comprise, among other things, the colours. The colour component values of claim 1 are the component that constitute the colour value. Document D9 teaches that the colour values are to be considered; the skilled person knows that colour values are represented by RGB data.

(ii) Starting from document D2

The same reasoning applies when the combination of documents D2 and D9 is envisaged.

Document D2 discloses an optically variable device (page 1, lines 1 to 4), the structure of which is disclosed in Figs. 1 and 2 and page 1, lines 25 to 28. The appellant also referred to Fig. 3 and the following passages: page 3, line 23; page 1, line 2; and page 2, line 8. Again, the device disclosed lacks only a reference to colour values. The objective technical problem is the same as for document D12 and its solution is obvious for the same reasons.

VII. The respondent argued as follows

(a) Inadmissible extension

Claim 11 does not constitute added matter; original claim 1 provides sufficient basis for the amendments.

Original claim 11 discloses the 3D shape by way of the "surface relief pixels". It also refers to "different angular orientations of the individual reflective surface relief pixels". Therefore, claim 11 as granted does not combine two distinct embodiments; they are already disclosed in combination in original claim 11.

The reference to the curvature in claim 11 as granted is supported by the disclosure of page 8, lines 5 to 9. This passage further defines the relief, in that it discloses that it has a curvature. Further support is found on page 7, lines 15 to 20 ("... predetermined angle and curvature properties ...").

It is true that this passage also discloses other features that have not been incorporated into the claim, but these features are not cited in the passage on page 8. Consequently, the features "angle" and "curvature" are not coupled with other features such as the size or number of the pixels.

There is no need to combine original claims 1 and 11 to reach the subject-matter claimed by claim 11 of the main request; the disclosure on page 8, lines 5 to 9, is sufficient. The skilled person knows that the 3D surface shape and curvature also has an optical effect; the claims have to be read with a willingness to understand. The reference to an algorithm is a

fundamental aspect of the invention that is already disclosed on page 3, lines 29 to 32.

Claim 1 is not inadmissibly extended either; the original application clearly and unambiguously discloses the use of a ZORO device. In this respect the opponent referred to page 7, lines 14 and 15, where the feature is disclosed as such, without any additional features.

The reference to a non-diffractive reflective structure is a reference to a ZORO structure, a device that is reflective and not diffractive. The expression "rather than" means "instead of".

(b) Admissibility of the auxiliary requests

Although filed at a late stage, the auxiliary requests should be admitted. The fourth, fifth, sixth and seventh auxiliary requests had been filed in response to objections first raised in the board's communication, by which it became clear that the board would not retain feature 11-8 when examining the patentability of the claimed subject-matter. The key aspect to be examined is the complexity of the submissions. In the present case, filing the sixth auxiliary request reduces the complexity of the case because there are now fewer independent claims. The filing of the new requests did not delay the proceedings. As there are only two requests left, convergence is no longer an issue. Convergence has to be judged on the day of oral proceedings, based on the requests on file at that time.

The prohibition of *reformatio in peius* is not part of the EPC. Even if the principle is admitted as part of

the jurisprudence of the boards of appeal, the appellant has to establish that it is being disadvantaged. The burden of proof is on the appellant in this respect. In the present case, there is no such disadvantage: the preceding requests, if allowed, granted the proprietor two monopolies (related to the method and the device), whereas the sixth auxiliary request, if granted, would only prevent the appellant from carrying out the method. Thus, the appellant has improved its position. *Reformatio in peius* is not an issue.

(c) Sixth auxiliary request: inventive step

Document D12, which has been filed late, should not be admitted into the proceedings because it is not *prima facie* relevant.

The objections raised by the appellant are based on *ex post facto* considerations ("rückschauende Betrachtungsweise"). The skilled person would not envisage combining documents D12 or D2 with document D9.

(i) Starting from document D12

It is an essential effect of the invention that colour values are used to determine the 3D structure of the pixels. This essential feature is absent from document D12. For this reason alone, document D12 cannot be more relevant than document D2, which already forms part of the proceedings. Moreover, document D12 does not disclose microstructures and 3D curvatures. While Fig. 6 shows a curvature, it is only in two dimensions. ZORO devices are not disclosed either. It should also be noted that document D12 concerns stereo images,

i.e. different images perceived as a three-dimensional image. Therefore, the effect is not based on a single optically invariable image. However, it is an essential feature of the invention that the effect is obtained on the basis of a single image. Thus, document D12 is not an appropriate starting point.

Document D9 refers to colours (see col. 4, lines 37 to 39: "Farbwert"), but there is only a reference to a single colour value, which could be a grey value. The use of several components of the colour value is not envisaged. Also, document D9 does not state that the relief structure is based on the colour and brightness parameters; see col. 8, lines 36 to 40. This disclosure can be understood to mean that the relief structure is determined by the brightness values, whereas the colour value determines the size of the pixels. Thus, the combination of documents D12 and D9 cannot lead to the claimed invention. Moreover, document D12 is based on the stereo effect, whereas this aspect is absent from document D9. Finally, document D12 deals with reflection, whereas document D9 makes use of diffraction.

It may be true that the colour values can be identical in claim 1, but the algorithm has to be such that at least two colour values have to be provided as input.

There is no indication in document D9 that a 3D image can be used as an invariable image.

(ii) Starting from document D2

The situation is similar to that of document D12. Again, this document deals with reflection, whereas document D9 makes use of diffraction.

Reasons for the Decision

1. Applicable law

The application on which the patent is based was filed on 6 May 2002. In accordance with Article 7 of the Act revising the EPC of 29 November 2000 (Special edition No. 4, OJ EPO, 217) and the Decision of the Administrative Council of 28 June 2001 on the transitional provisions under Article 7 of the Act revising the EPC of 29 November 2000 (Special edition No. 4, OJ EPO, 219), Articles 56 and 100 EPC 1973 and Article 123 EPC [2000] apply in the present case.

2. Main request

2.1 Interpretational matters

2.1.1 "optically variable image"

Claims 1 and 11 define an optically variable image as an image that varies according to the position of observation. In other words, the image must be such that it is possible for an observer looking at the optical device to perceive a variation of the image when the relative position of the observer with respect to the device changes. However, effects that are simply geometric (perspective distortion, distance-dependent perception of size, etc.) cannot qualify as optical

variations as commonly understood in the field of security devices. Typical optical variations as understood by common general knowledge are changes in colour, contrast, or intensity. An image appearing or disappearing upon tilting or rotation of its support would also qualify as optically variable image.

2.1.2 "optically invariable image"

The question arises as to how the correspondence between the optically variable image and its optically invariable counterpart is to be understood. Does the optical device contain both an optically variable and an optically invariable image and describe a certain correspondence between them, so that when the optical device is tilted or rotated, the optically variable image changes while its optically invariable counterpart remains unaffected? The fact that the counterpart image is said to be "optically invariable" might suggest such a 'physical' understanding.

When trying to clarify this matter, the skilled person would consider the context, i.e. the whole content of the patent, and realise that this is not what is meant. In fact, in the context of the patent, the optically invariable image is an image that constitutes the basis for defining the optically variable image.

A mathematical or computer algorithm is applied to the optically invariable image in order to generate the elements of what is to become the optically variable image. Therefore, the optical device need not comprise the optically invariable counterpart image as such; the latter can, for instance, only exist in the memory of a computer (see in particular page 6, lines 16-17 of the patent).

Accordingly, the fact that the counterpart image is said to be "optically invariable" only serves to make clear that it is not optically variable within the meaning of claims 1 and 11; in other words, the optically variable nature of the image produced by the optical device is not something conferred by the underlying counterpart image.

2.1.3 "ZORO surface microstructure"

There appears to be no generally accepted definition of "Zero Order Reflective Optic" (ZORO) devices. It is, however, part of the general knowledge of the skilled person that zero-order diffraction corresponds to the case of specular reflection (where $d \cdot \sin\theta = 0 \cdot \lambda$ is fulfilled for $\theta = 180^\circ$). In other words, a zero-order diffraction device acts as a mirror.

The disclosure of ZORO devices in the patent is concentrated in paragraph [0019], according to which:

- ZORO devices are multiplexed micro-mirror array devices;
- they "use reflection rather than diffraction as their fundamental [optically variable device] mechanism";
- typical microstructures of this type contain up to one million micro mirror surface regions of $30 \times 30 \mu\text{m}^2$ or less;
- such devices may be produced "via a multi-step process using a combination of electron beam lithography, plasma etching or wet chemical etching, photolithography and other specialised processes adopted from the semiconductor industry".

Having considered all the above, the board has reached the conclusion that the expression "ZORO surface microstructure" corresponds to a microstructure that acts as a mirror. If a pixel of an array is formed by such a microstructure, the latter may be referred to as a "ZORO surface relief pixel" and the array forms a "pixellated reflective structure" according to claim 11.

Accordingly, a microstructure can only qualify as a ZORO microstructure if reflection is by far the dominant light scattering mechanism. Microstructures that exhibit a significant amount of diffraction do not qualify as ZORO microstructures.

2.1.4 "three-dimensional surface shape and curvature"

Claims 1 and 11 require each pixel of the reflective structure to have a three-dimensional "surface shape and curvature". The patent does not provide a particular definition of "surface shape" and "surface curvature". Consequently, these terms are given their broadest technically meaningful interpretation. Accordingly, "surface shape" is understood to refer to the external form or appearance of the surface. All the uses of the expressions in the description of the patent (see paragraphs [0011] and [0013]) are in line with this interpretation. "Surface curvature" is understood to mean a measure of the deviation of the surface from a plane, which is a surface of zero curvature. As such it is one of the parameters that can be used to describe the shape of the surface.

- 2.1.5 "the optically variability is produced by differing angular orientations" (feature 11-9)

The board understands the expression "optically variability" to be the result of an obvious typing error. There is no doubt that "optical variability" was meant. The feature is interpreted accordingly.

The use of the definitive article "the" is understood to convey that there is no optical variability that is caused by mechanisms other than differing angular orientations of the individual ZORO pixels.

- 2.2 Added matter (Article 123(2) EPC)

The crucial question is whether the incorporation of features 11-7 and 11-8 into claim 11 as granted has generated subject-matter that is not directly and unambiguously disclosed in the application on which the patent is based.

The expression "three-dimensional surface shape and curvature" is only found in original claim 1. The assertion that claim 11 as amended is not based on original claim 1 but finds support in other parts of the original disclosure, such as page 8, lines 5 to 9, and page 7, lines 15 to 20, is found unpersuasive because neither of those passages refers to a "three-dimensional surface shape and curvature": the passage on page 8, lines 7 to 9, refers to "surface slope directions and degree of curvature", whereas the sentence on page 7, lines 19 and 20, refers in general terms to "predetermined angle and curvature properties". Both expressions are unclear to some extent and cannot establish a direct and unambiguous disclosure of the feature under consideration.

Original claim 1 corresponds to what is referred to as "a first aspect of the invention" in the original description (see page 4, line 27, to page 5, line 8), i.e. a method of manufacturing an optical device. One feature of this method consists in determining a pixel surface structure having a 3D surface shape and curvature. Each pixel surface structure produces an optical effect (feature 1-6). The assembly of the pixel surface structures produces an overall optically variable effect, which is based on an optically invariable image (feature 1-7). In other words, the optically variable effect results from the sum of optical effects of the pixels, which are the expression of the particular surface shape and curvature of each pixel.

Original claims 11 and 13 are directed at what are disclosed as second and third aspects of the invention, respectively (see page 5, lines 9 to 17 and 18 to 27). Both claims define optical devices that provide an optically variable image. The particularity of original claim 11 resides in the fact that the optical variability is produced by differing angular orientations of the individual reflective surface relief pixels, i.e. a particular variation of the "shape" of the pixels (see point 2.1.4).

Claim 11 of the main request differs from original claim 11 on several counts, and in particular by the introduction of features 11-7 and 11-8. As a result, the more general concept of the optical effects being generated by means of a variation of the surface shape and curvature of the pixels has been incorporated into original claim 11, which corresponds to a particular embodiment in which the optical variability is

exclusively (see point 2.1.5) due to a variation of the angular orientations of the pixels. This amendment is of doubtful clarity and leads to a hybrid device in which the surface shape and curvature of the pixels vary, but the optical effect is due to the angular orientations of the pixels alone. Having been unable to identify a direct and unambiguous disclosure of this subject-matter in the original application, the board has reached the conclusion that claim 11 does not comply with the requirements of Article 123(2) EPC.

As a consequence, the main request cannot be granted.

In view of this outcome, it is not necessary for the board to deal with the other objections raised against the main request.

3. Admissibility of the auxiliary requests

Auxiliary requests 1 to 3 were filed with the response to the statement of grounds of appeal; the board has the power to hold them inadmissible, in application of Article 12(4) of the Rules of Procedure of the Boards of Appeal (RPBA). Auxiliary requests 4 to 7 were filed with the letter of 19 December 2018; their admission is within the discretion of the board under Article 13(1) RPBA.

The device claims of auxiliary requests 1 to 5 and 7 all suffer from the deficiency that has led to dismissal of the main request. Since the requests are not allowable, the board has decided not to admit them into the proceedings.

The sixth auxiliary request constitutes a limitation of the first auxiliary request insofar as all the device

claims have been deleted and only the method claims have been maintained. Although the request may be said to constitute a response to an objection raised in the board's communication, the objection was not raised for the first time by the board. Thus, there were good reasons to file the request at an earlier stage of the proceedings. That being said, the appellant had to prepare objections to the method claims, in case the board deviated from its provisional opinion in respect of the device claims. Therefore, the appellant could not be surprised by the claims that remain on file.

Having considered and weighed all the above and the consequences of the sixth auxiliary request not being admitted, the board has decided to exercise its discretion under Article 13(1) RPBA and to admit the sixth auxiliary request to the proceedings.

4. *Reformatio in peius?*

The principle prohibiting *reformatio in peius* does not make the sixth auxiliary request inadmissible, because this request, if granted, would not lead to a situation in which the appellant is worse off than if it had not filed the appeal.

The main request, on the basis of which the patent would have been maintained if the opponent had not filed an appeal, contained both method and product claims. A patent based on this request would have allowed the patent proprietor to prevent the opponent (and indeed any third parties) from using the claimed method and from manufacturing the claimed devices. The sixth auxiliary request is a request in which all product claims have been deleted and only method claims are maintained. As a consequence, if this request was

allowed, the patent based on this request would only allow the patent proprietor to prevent the opponent from carrying out the claimed method. Thus, the appeal would have improved the situation of the appellant.

As a consequence, the principle prohibiting *reformatio in peius* cannot be brought to bear in this case.

5. Admissibility of document D12

Document D12, of which the priority document is cited in document D2, was filed at an early stage of the appeal proceedings. There is no evidence that its filing corresponds to an abuse of procedure. Therefore, the board has decided to admit the document into the proceedings.

6. Sixth auxiliary request: inventive step

6.1 Starting point

The appellant presented attacks starting from documents D12 and D2. Having considered both documents, the board has reached the conclusion that document D2 is a more appropriate starting point because it is closer to the field of the invention, i.e. anti-forgery security devices (see paragraph [0001] of the patent).

Document D2 explicitly refers to this field (see page 1, lines 5 to 15), whereas document D12 is drafted in more general terms and only contains passing references to documents of value (see page 1, lines 28 to 29, and page 6, lines 38 to 39). That being said, the precise choice of starting point is not decisive, because the parties agreed that claim 1 differed from both documents by the same features.

6.2 Differences

Both parties agreed that document D2 (and document D12) did not disclose features 1-3 and 1-5, according to which the 3D surface shape and curvature of the pixels of the associated pixel surface structure is based on colour component values of the pixels of the optically invariable image.

6.3 Objective technical problem

The definitions of the objective technical problem proposed by the appellant cannot be endorsed, for the following reasons:

- In its statement of grounds of appeal (page 28, penultimate paragraph) the appellant formulated the objective technical problem as the provision of a simple method of manufacturing an optical device that is capable of monochromically displaying a coloured, optically invariant image. This formulation is not satisfactory because it contains a pointer to the claimed solution.
- In the course of the oral proceedings before the board, the appellant offered another definition for the objective technical problem, namely the provision of a method of manufacturing an optical device generating an optically variable image in which the underlying optically invariable image can be a coloured image. This formulation appears not to be suitable either, because the method of document D2 (or D12) appears to be applicable to coloured optically invariable images: there is no reason why such images could not be used.

The skilled person would understand that the fact that colour component values of the pixels of the optically invariable image are used for defining the pixels that generate the optically variable image has the consequence that a complex optical behaviour is obtained in a reproducible way.

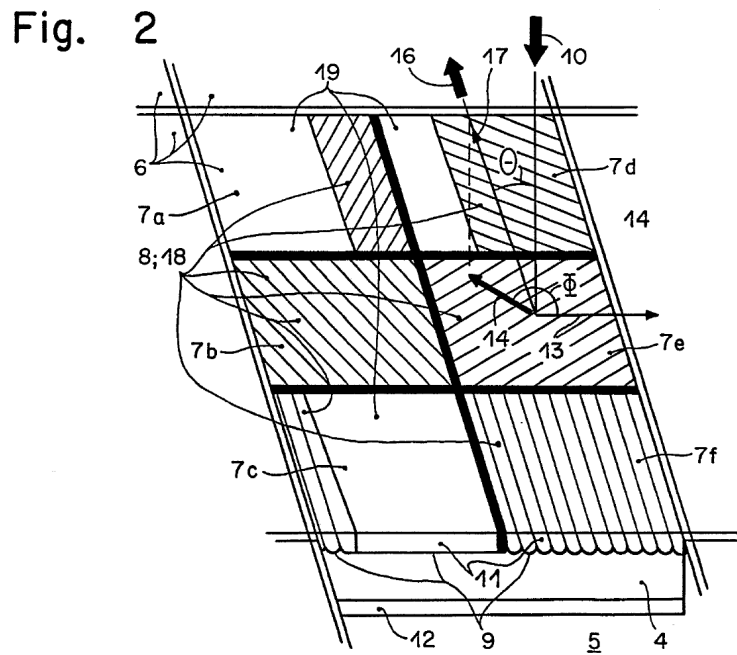
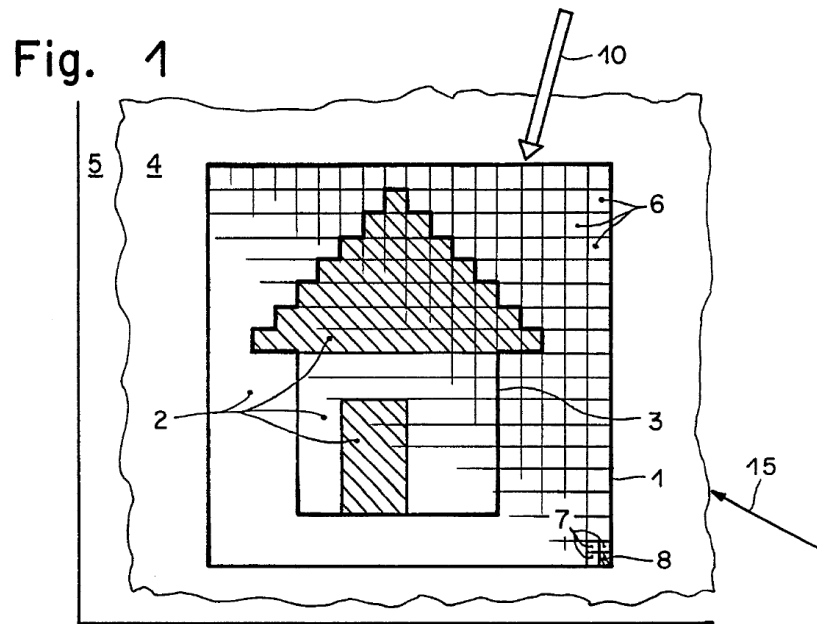
Thus, the objective technical problem can be defined as modifying the known method of manufacturing the optical device such that the security of the device against counterfeiting is improved.

6.4 Obviousness

Document D9 presents itself as a solution to the problem of creating a light-modifying surface pattern which is difficult to copy and which changes in a predetermined way (see col. 2, lines 10 to 18).

Arguably, the skilled person starting from document D2 (or D12) and faced with the objective technical problem as defined above (see point 6.3) would consider the teaching of document D9.

The core teaching of document D9 is to divide the image into a certain number of grid elements 6 each of which contains N optically active diffraction elements 8 (in the example shown in Fig. 2, $N = 6$); depending on the direction of observation, one of N representations (one of which is shown in Fig. 1) is apparent to an onlooker (see claim 1).



It is not apparent to the board how the core teaching of document D9 would lead those skilled in the art to modify the device of document D2 (or D12) in such a way that they would obtain a device falling within claim 1 of the sixth auxiliary request.

It is correct that there are two passages in document D9 that refer to colour values in the context of particular embodiments (see col. 4, lines 37 to 46, and col.8, lines 28 to 40), the first of which associates the colour value of the pixel with "important parameters" of the relief structure 9 of the diffraction element 8 assigned to the pixel. However, this information is only provided as part of an exemplary embodiment. No particular advantage is disclosed in respect of these features. Also, none of the claims of document D9, which arguably describe what the drafter of the document understood to be its contribution to the art, makes any mention of colour values.

Consequently, the skilled person considering the disclosure of document D9 as a possible solution to the objective technical problem would not be led by its teaching to modify the device of document D2 (or D12) such as to obtain a device falling within claim 1 of the sixth auxiliary request.

Thus, the board reaches the conclusion that the appellant has not convincingly shown that the subject-matter of claim 1 lacks inventive step over the state of the art.

It follows that the patent can be maintained in amended form on the basis of the sixth auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the following documents:
 - claims 1 to 10 filed as sixth auxiliary request with the letter of 19 December 2018;
 - page 2 of the description of the patent as granted;
 - pages 3 to 6 of the description as filed during the oral proceedings;
 - Figures 1 to 13 of the patent as granted.

The Registrar:

The Chairman:



N. Schneider

M. Poock

Decision electronically authenticated