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Datasheet for the decision of 6 October 2021

Case Number: T 2026/18 - 3.4.02

Application Number: 11705995.6

Publication Number: 2542424

IPC: B42D15/00, G02B3/00, G07D7/20, G07D7/00

Language of the proceedings: EN

Title of invention:
MOIRE MAGNIFICATION DEVICE

Patent Proprietor:
De La Rue International Limited

Opponent:
Giesecke+Devrient Currency Technology GmbH

Relevant legal provisions:
EPC Art. 56, 84, 100(a)
RPBA Art. 12(4)
RPBA 2020 Art. 13(2)

Keyword:
Request regrouping different independent claims respectively defined in previous requests: Admission (first and second auxiliary requests: yes)
Request amended in appeal to comply with the prohibition of reformatio in peius: Admission (third auxiliary request: yes)
Request amended by deletion of independent claims: Admission (fourth auxiliary request: no; fifth auxiliary request: yes)
Clarity of claims (first to third auxiliary requests: no)
Inventive step (main request: no; fifth auxiliary request: yes)

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Case Number: T 2026/18 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 6 October 2021

Appellant: (Opponent)	Giesecke+Devrient Currency Technology GmbH Prinzregentenstraße 159 81677 München (DE)
Representative:	Zeuner, Stefan Zeuner Summerer Stütz Nußbaumstraße 8 80336 München (DE)
Respondent: (Patent Proprietor)	De La Rue International Limited De La Rue House Jays Close Viables Basingstoke RG22 4BS (GB)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 1 June 2018 concerning maintenance of the European Patent No. 2542424 in amended form.**

Composition of the Board:

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

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the interlocutory decision of the opposition division finding European patent No. 2542424 as amended according to the third auxiliary request then on file to meet the requirements of the EPC.

The opposition filed by the appellant against the patent as a whole was based on the grounds for opposition of lack of novelty and lack of inventive step (Article 100(a), together with Articles 52(1), 54 and 56 EPC).

II. During the appeal proceedings the parties referred, among other documents, to the following documents considered during the first-instance proceedings:

D2: WO 2006/125224 A2
D3: EP 1 953 002 A2
D4: WO 2008/000351 A2
D9: WO 2010/015382 A2.

In the decision under appeal the opposition division held *inter alia* that the invention defined in the claims of the then third auxiliary requests was novel and involved an inventive step, in particular over documents D3, D4 and D9.

III. In a communication accompanying the summons to oral proceedings the board presented a preliminary assessment of the case.

IV. In reply to the summons to oral proceedings the respondent (patent proprietor) submitted with the letter dated 6 August 2021 claims according to auxiliary requests 1 to 15.

V. Oral proceedings before the board were held on 6 October 2021.

During the oral proceedings the respondent filed claims 1 to 21 according to a new fourth auxiliary request, and pages 1 to 52 of the description according to a ninth auxiliary request.

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

The respondent requested as a main request that the appeal be dismissed, i.e. that the patent be maintained in amended form as found allowable by the opposition division. Auxiliarily, the appellant requested 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 auxiliary requests 1 to 3, all requests filed with the letter dated 6 August 2021, or according to the new fourth auxiliary request filed during oral proceedings on 6 October 2021, or according to the fifth auxiliary request, filed as auxiliary request 9 with the letter dated 6 August 2021, or according to auxiliary requests 10 to 15, all filed with the letter dated 6 August 2021. The fifth auxiliary request comprised description pages 1 to 52 according to the ninth auxiliary request filed during the oral proceedings held on 6 October 2021 and the figures on sheets 32 to 64 of the patent specification.

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

VI. Independent claims 1, 3, 10 and 20 of the main request, i.e. of the third auxiliary request underlying the decision under appeal, read as follows:

"1. A moiré magnification device comprising a transparent substrate carrying:

i) a regular array of micro-focusing elements on a first surface, the focusing elements defining a focal plane;

ii) a corresponding first array of microimage elements in a first colour and located in a plane substantially coincident with the focal plane of the focusing elements;

and, characterised by

iii) a corresponding second array of microimage elements, in a second colour different from the first colour, and located in a plane substantially coincident with the focal plane of the focusing elements, the second array of microimage elements being laterally offset from the first,

wherein the pitches of the micro-focusing elements and first and second arrays of microimage elements and their relative locations are such that the array of micro-focusing elements cooperates with each of the first and second arrays of microimage elements to generate magnified versions of the microimage elements of each array due to the moiré effect

and such that an interruption zone of non-zero width is perceived between the magnified version of the first microimage array and the magnified version of the second microimage array, the interruption zone exhibiting no magnified version of either microimage

array, wherein the first array of microimage elements is laterally spaced from the second array of microimage elements by a boundary region of non-zero width which is free of microimage elements, thereby giving rise to the interruption zone perceived by the viewer, and wherein the width of the microimage element-free boundary region is greater than the maximum pitch of either of the microimage element arrays."

"3. A moiré magnification device comprising a transparent substrate carrying:

i) a regular array of micro-focusing elements on a first surface, the focusing elements defining a focal plane;

ii) a corresponding first array of microimage elements in a first colour and located in a plane substantially coincident with the focal plane of the focusing elements;

and, characterised by

iii) a corresponding second array of microimage elements, in a second colour different from the first colour, and located in a plane substantially coincident with the focal plane of the focusing elements, the second array of microimage elements being laterally offset from the first,

wherein the pitches of the micro-focusing elements and first and second arrays of microimage elements and their relative locations are such that the array of micro-focusing elements cooperates with each of the first and second arrays of microimage elements to generate magnified versions of the microimage elements of each array due to the moiré effect

and such that an interruption zone of non-zero width is perceived between the magnified version of the first microimage array and the magnified version of the

second microimage array, the interruption zone exhibiting no magnified version of either microimage array, wherein the regular array of micro-focusing elements comprises first and second regular arrays of micro-focusing elements laterally spaced from one another by a boundary region of non-zero width which is free of functioning micro-focusing elements, the boundary region being aligned with the transition between the first array of microimage elements and the second, thereby giving rise to the interruption zone perceived by the viewer, and wherein the width of the micro-focusing element-free boundary region is greater than the maximum pitch of either of the micro-focusing element arrays."

"10. A method of manufacturing a moiré magnification device, comprising, in any order:

a) forming a regular array of micro-focusing elements on a first surface of a transparent substrate, the focusing elements defining a focal plane;

b) forming on a second surface of the transparent substrate, in a first working, a corresponding first array of microimage elements in a first colour and located in a plane substantially coincident with the focal plane of the focusing elements;

and, characterised by

c) forming on the second surface of the transparent substrate, in a second working, a corresponding second array of microimage elements, in a second colour different from the first colour, and located in a plane substantially coincident with the focal plane of the focusing elements, the second array of microimage elements being laterally offset from the first,

wherein the pitches of the micro-focusing elements and first and second arrays of microimage elements and their relative locations are such that the array of

micro-focusing elements cooperates with each of the first and second arrays of microimage elements to generate respective magnified versions of the microimage elements of each array due to the moiré effect and are such that the device displays an interruption zone of non-zero width between the between the [*sic*] magnified version of the first microimage array and the magnified version of the second microimage array, the interruption zone exhibiting no magnified version of either microimage array,

wherein the first array of microimage elements is laterally spaced from the second array of microimage elements by a boundary region of non-zero width which is free of microimage elements, thereby giving rise to the interruption zone perceived by the viewer, and the width of the microimage element-free boundary region is greater than the maximum pitch of either of the microimage element arrays."

"20. A method of manufacturing a moiré magnification device, comprising, in any order:

a) forming a regular array of micro-focusing elements on a first surface of a transparent substrate, the focusing elements defining a focal plane;

b) forming on a second surface of the transparent substrate, in a first working, a corresponding first array of microimage elements in a first colour and located in a plane substantially coincident with the focal plane of the focusing elements;

and, characterised by

c) forming on the second surface of the transparent substrate, in a second working, a corresponding second array of microimage elements, in a second colour different from the first colour, and located in a plane substantially coincident with the focal plane of the

focusing elements, the second array of microimage elements being laterally offset from the first,

wherein the pitches of the micro-focusing elements and first and second arrays of microimage elements and their relative locations are such that the array of micro-focusing elements cooperates with each of the first and second arrays of microimage elements to generate respective magnified versions of the microimage elements of each array due to the moiré effect and are such that the device displays an interruption zone of non-zero width between the between the [*sic*] magnified version of the first microimage array and the magnified version of the second microimage array, the interruption zone exhibiting no magnified version of either microimage array, wherein step (a) comprises forming first and second regular arrays of micro-focusing elements laterally spaced from one another by a boundary region of non-zero width Δr which is free of functioning micro-focusing elements, the boundary region being aligned with the transition between the first array of microimage elements and the second, thereby giving rise to the interruption zone perceived by the viewer, and wherein the width of the micro-focusing element-free boundary region is greater than the maximum pitch of either of the micro-focusing element arrays."

Independent claim 3 of auxiliary request 1 differs from independent claim 3 of the main request in that the following feature is inserted before the last phrase of the last paragraph of the claim reading "and wherein the width of the micro-focusing element-free boundary region is greater than [...] of the micro-focusing element arrays.":

"wherein the first and second arrays of microimage elements each extend into the boundary region,".

Independent claim 3 of auxiliary request 2 differs from independent claim 3 of the main request in that paragraph "iii)" of the claim further reads as follows:

", and the first and second arrays of microimages partially overlapping one another;".

Independent claim 3 of auxiliary request 3 differs from independent claim 3 of the main request in that the respective expressions "a corresponding first array of microimage elements" and "a corresponding second array of microimage elements" in paragraphs "ii)" and "iii)" of the claim read "a first print working defining a corresponding first array of microimage elements" and "a second print working defining a corresponding second array of microimage elements", respectively.

The claims of the new fourth auxiliary request differ from the claims of the main request in that independent claim 3 and the dependent claims only referring back to independent claim 3 have been deleted, and the remaining claims have been appropriately renumbered.

The claims of the fifth auxiliary request differ from the claims of the main request in that independent claims 3 and 20 and the dependent claims only referring to them have been deleted, and the remaining independent claims 1 and 10 and the remaining claims 2, 6 to 9 and 11 to 19 have been renumbered as independent claims 1 and 7 and as claims 2 to 6 and 8 to 16, respectively. Claims 2 and 3 are dependent claims referring back to claim 1, claims 4 and 6 are respectively directed to a security device and to an

article of value comprising the device of claim 1, dependent claim 5 refers back to claim 4, and dependent claims 8 to 16 refer back to independent claim 7.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request - Independent claim 3*

2.1 Novelty

2.1.1 In its decision the opposition division held that the subject-matter of independent claim 3 of the third auxiliary request then on file and now main request was new over the documents considered during the opposition proceedings, and this view was not contested in appeal.

2.1.2 In particular, and as held by the opposition division in its decision, the device defined in independent claim 3 differs from the device disclosed in document D3 by reference to Fig. 1 (see paragraphs [0022] to [0023], [0033], [0034], [0036] and [0039]) in that the microimage element arrays (i.e. two neighbouring ones of the arrays 22 of microimage elements 17 in Fig. 1 of document D3) have a different colour.

The respondent submitted that the boundary region of non-zero width and free of functioning micro-focusing elements of the device of Fig. 1 of document D3 (boundary region 14 in Fig. 1) was not "aligned with the transition" between the first and the second arrays of microimage elements as claimed because there was no transition between two arrays of a different colour

with which it could be aligned, and that therefore this feature constituted a further distinguishing feature of claim 3 over document D3. The board, however, is unable to identify in these arguments a distinguishing feature going beyond the distinguishing feature mentioned above relating to the two microimage element arrays having a different colour because the arrays 22 of microimage elements of the device of Fig. 1 of document D3 constitute - irrespective of the characteristics of the elements such as shape, colour, etc. - distinct arrays and each pair of neighbouring arrays determine a transition between them aligned with the corresponding boundary region 14 having a non-zero width and being free of functioning micro-focusing elements as claimed. In other words, in the event that two neighbouring arrays 22 of microimage elements of the device of document D3 are provided with different colours, the transition between the two arrays having different colours would then be aligned with the boundary region 14 (Fig. 1), and - contrary to the respondent's view - no additional step would be required to achieve the claimed arrangement.

Therefore, the device defined in independent claim 3 differs from the device disclosed in document D3 by reference to Fig. 1 only in that the microimage element arrays have a different colour.

2.1.3 Having regard to the above, the subject-matter of independent claim 3 of the main request is novel over document D3 and also novel over the remaining documents considered during the proceedings (Articles 52(1) and 54(1) EPC).

2.2 Inventive step

2.2.1 The appellant contested the opposition division's view that the subject-matter of independent claim 3 involved an inventive step, in particular over a combination of document D3 as closest state of the art with either one of documents D4 and D9.

2.2.2 The respondent submitted that the closest state of the art was represented by document D9, and not by document D3, so that document D3 was not a suitable starting point for the assessment of inventive step.

The board, however, sees no reason for disregarding document D3 as closest state of the art because, as already noted by the opposition division in its decision, the problem-solution approach does not rule out the consideration of different, alternative starting points as closest state of the art. The board also notes that if the subject-matter of independent claim 3 involves an inventive step within the meaning of Article 56 EPC, it should, in particular, involve an inventive step when starting with document D3 as closest state of the art.

2.2.3 According to the appellant, and as also maintained by the opposition division in its decision, the claimed device, and in particular the distinguishing feature mentioned in point 2.1.2 above, solved the objective problem of providing a different or more complex appearance.

The respondent contested this view and submitted in connection with their arguments already addressed in point 2.1.2 above that the objective problem was to be formulated in terms of providing a multi-coloured effect or a different or more complex appearance, while increasing the tolerance for mis-registration between

the microimage element arrays, i.e. without the requirement for a perfect registration between neighbouring microimage element arrays.

However, in the board's view this formulation of the objective problem is not supported by the distinguishing feature of claim 1 over document D3 because, to the extent that the claimed subject-matter might have an effect on the problem of mis-registrations between the microimage element arrays 22 occurring, for instance, during the manufacture of the device, this same effect is already inherently achieved by the device of document D3 in view of the presence in the device of the boundary region 14 having a non-zero width, being free of functioning micro-focusing elements, and being aligned with the transition between neighbouring arrays of microimage elements as required by the claimed subject-matter.

Therefore, the board concurs with the appellant's and the opposition division's view that the objective technical problem solved by the claimed device over the device disclosed in document D3 as a security element having a predetermined visual appearance (title) is to be seen in the provision of the device with a different or more complex appearance.

2.2.4 During the appeal proceedings the parties addressed the question of whether document D3 already pointed to or, on the contrary, taught away from endowing the arrays of microimage elements with a different appearance, and in particular with a different colour.

The board notes that according to document D3 each of the regions 22 can contain an array of microimage

elements 17 (see Fig. 1, and page 3, lines 56 to 58) and the microimage elements are preferably identical (page 4, lines 7 and 8, and page 7, lines 19 and 20). According to the document, different microimage elements can also be formed in a repetitive pattern in the regions 22 of Fig. 1 (page 7, lines 20 and 21). However, it is not unambiguously clear in the mentioned disclosure of document D3 whether the microimage elements of the array of microimage elements within a same region 22 can be different, or whether the array of microimage elements of one region can be different from the array of another one of the regions. In addition, the disclosed difference between the microimage elements appears to refer in its technical context to the shape, and not to the colour, and, in any case, there is no clear and unambiguous indication in document D3 that the array of microimage elements of one of the regions 22 might be formed with a colour different from that of the array of another region 22.

Analogous considerations apply to the disclosure of document D3 relating to the formation of multicoloured microimage elements in the regions 22 by application of the decorative layer 12 in the form of a structured set of differently coloured lacquer layers (paragraphs [0039] and [0040]). As acknowledged by the appellant, this disclosure is ambiguous as to whether each of the microimage elements in each of the regions 22 is multicoloured or whether the elements within each of the regions differ in colour from each other; in any case, contrary to the appellant's view, the mentioned disclosure does not contain a clear hint towards forming the array of microimage elements of one of the regions differently - let alone in colour - from the array of another one of the regions.

Therefore, the board concurs with the appellant that document D3 does not teach away - at least not explicitly - from differently forming the arrays of the different regions, but the document does not contain any clear and unambiguous indication towards this approach either.

2.2.5 As regards the issue of inventive step of the claimed solution over document D3 in combination with document D4 or document D9, the board notes the following:

Each of documents D4 and D9 disclose a device of the type disclosed in document D3, i.e. a device comprising arrays of microimage elements and arrays of micro-focusing elements coupled to each other so as to form magnified images by virtue of the Moiré effect (D4, Fig. 2, together with page 11, line 16, to page 12, line 11; and D9, Fig. 5, together with page 48, line 27, to page 50, line 20, and page 9, lines 14 to 21). Moreover, each of documents D4 and D9 disclose using for the imaging elements within each of the arrays in a section of the device a colour different from the colour of the elements within the arrays of an adjacent section of the device for the purpose of introducing a visual colour contrast between the two sectors and integrating additional information (see document D4, page 15, lines 21 to 23, together with page 4, lines 9 to 18 and Fig. 3a to 3c; and document D9, Fig. 5, together with page 50, lines 12 to 20).

In addition, the device of document D3 includes a plurality of boundary regions as claimed, each region separating different adjacent sections of the device (Fig. 1; see also Fig. 6a and 6b and the corresponding description), and the skilled person confronted with the problem of providing a different or more complex

appearance to the resulting image viewed by an observer and aware of the teaching of any of documents D4 and D9 would consider forming the imaging elements on one side of one of the mentioned boundary regions with a colour different from the colour of the imaging elements on the other side of the boundary region in order to introduce a visual colour contrast between the two sides and integrating an additional information feature into the device, thus arriving in an obvious way at the claimed subject-matter.

In addition, in the board's opinion

- neither the fact that in document D3 the microimage element arrays are spatially separated and in document D4 and D9 the neighbouring arrays of microimage elements abut each other, thus giving rise to further visual effects (see, for instance, document D4, Fig. 3, 5 and 6, together with the corresponding description, and document D9, page 11, lines 2 to 5),
- nor the fact that document D9 refers to the provision of the micro-focusing element array as being either manually separable from (page 9, lines 14 to 21) or integral with the microimage element arrays (paragraph bridging pages 33 and 34),
- nor the fact that document D9 refers to the provision of a uniform lattice array structure for the whole of the microimage element arrays (paragraph bridging pages 10 and 11),
- nor the fact that the boundary regions 14 of the device of document D3 together with the underlying regions (regions 21 in Fig. 1) may, in addition to inherently providing a visual separation between the arrays (Fig. 1, and paragraph [0011]), also serve other technical functions and in particular the function of adhering the device to another body (claim 1 of document D3),

- nor the fact that document D4 is primarily directed to improving the visual contrast between the different regions of the device (page 5, lines 16 to 18)

would - contrary to the view expressed by the respondent during the proceedings - dissuade the skilled person from following the approach mentioned above in order to solve the objective problem under consideration because, as submitted by the appellant, both documents D4 and D9 contain a clear teaching relating to the use of different colours for neighbouring microimage element arrays and this teaching is independent of the specific features of the corresponding devices mentioned above.

The arguments given by the opposition division in its decision in support of its view that the claimed device would not be rendered obvious by the combination of document D3 with either one of documents D4 and D9 are, in the board's opinion, not persuasive because, contrary to the opposition division's view, document D4, as already mentioned above, unambiguously discloses that neighbouring arrays of microimage elements can be formed with different colours, and document D9 teaches the use of different colours in the context of endowing the adjacent sections of the device with a different or more complex visual appearance (see page 50, lines 12 to 20), and not - as maintained by the opposition division - in the context of merely enhancing the optical separability between neighbouring arrays.

2.2.6 In view of the above considerations, the board concludes that the subject-matter of independent claim 3 does not involve an inventive step over document D3 in combination with the disclosure of

either one of documents D4 and D9 (Article 56 EPC). For these reasons, the main request is not allowable.

3. *Auxiliary request 1 - Independent claim 3*

3.1 Admission

The claims of auxiliary request 1 were submitted with the letter dated 6 August 2021 filed after the notification of the summons to the oral proceedings before the board. The claims comprise independent claims 1 and 10 identical to the corresponding claims 1 and 10 of the present main request, and independent claims 3 and 20 identical to the corresponding claims 3 and 20 of the first auxiliary request submitted with the letter dated 8 February 2019 filed in reply to the statement of grounds of appeal and also identical to the corresponding claims 3 and 20 of the fourth auxiliary request filed during the first-instance proceedings by letter dated 5 January 2018.

Therefore, the independent claims of auxiliary request 1 consist of independent claims that were already defined in different auxiliary requests considered during both the first-instance and the appeal proceedings, these independent claims together with the corresponding dependent claims having been re-grouped in the present auxiliary request 1 in view of the preliminary opinion expressed by the board in the communication annexed to the summons to oral proceedings. Furthermore, the way these claims were re-grouped in the present auxiliary request 1 did not give rise to new substantive issues when compared with the corresponding claims of the mentioned previous auxiliary requests. In addition, the appellant did not contest the admission of auxiliary request 1 into the

proceedings, and the board saw no reason not to admit this request into the proceedings.

In view of the above considerations, the board decided to admit the claims of auxiliary request 1 into the proceedings (Article 13(2) RPBA 2020, which applies in the present case according to Article 25 RPBA 2020).

3.2 Article 84 EPC

When compared with independent claim 3 of the main request, independent claim 3 of auxiliary request 1 has been amended by incorporation of the feature requiring that "the first and second arrays of microimage elements each extend into the boundary region".

The boundary region is defined in the claim as a region formed by the lateral separation between the first and the second arrays of micro-focusing elements lying on a first plane, and according to the claim the first and second arrays of microimage element arrays are located in a plane substantially coincident with the focal plane of the focusing elements and therefore in a second plane below the mentioned first plane. The amended feature requiring that the first and second microimage element arrays "extend into the boundary region" can therefore be interpreted in the context of the claimed subject-matter in the sense that the microimage element arrays extend within the second plane into the three-dimensional region of the device determined by the separation formed between the first and the second micro-focusing element arrays, but also in the sense that they extend into the separation formed between the first and the second micro-focusing element arrays and therefore into the first plane. For

this reason, and as submitted by the appellant, the feature introduced into the claim renders the claim unclear.

The respondent disputed this view and submitted that the claimed boundary region is not a two-dimensional region lying in the plane of the micro-focusing elements, but a three-dimensional region of the device, and that the skilled person willing to understand would construe the claimed subject-matter as requiring that the first and second microimage element arrays extend into this three-dimensional region within the second of the mentioned planes as supported by Fig. 15 of the patent specification.

However, as noted by the appellant by reference to the description of Fig. 15 on pages 36 and 37 of the application as filed (see the corresponding passages in paragraphs [0147] to [0150] of the patent specification), the claimed boundary region is disclosed in the description as a region formed in the plane of the micro-focusing elements. Therefore, the respondent's reference to the description does not clarify the meaning of the mentioned feature incorporated into independent claim 3, but it rather emphasises the objection that the mentioned feature can be interpreted in different ways and renders the claim unclear.

In view of these considerations, the board concludes that independent claim 3 is not clear (Article 84 EPC) and that, consequently, auxiliary request 1 is not allowable.

4. *Auxiliary request 2 - Independent claim 3*

4.1 Admission

The claims of auxiliary request 2 were submitted with the letter dated 6 August 2021 filed after the notification of the summons to the oral proceedings before the board. The claims comprise independent claims 1 and 10 identical to the corresponding claims 1 and 10 of the present main request, and independent claims 3 and 20 identical to the corresponding claims 3 and 20 of the second auxiliary request submitted with the letter dated 8 February 2019 filed in reply to the statement of grounds of appeal and also identical to the corresponding claims 3 and 20 of the fifth auxiliary request filed during the first-instance proceedings by letter dated 5 January 2018.

Considerations analogous to those set forth in point 3.1 above, second paragraph, in respect of the claims of auxiliary request 1 also apply to the claims of auxiliary request 2.

In view of these considerations, the board decided to admit the claims of auxiliary request 2 into the proceedings (Article 13(2) RPBA 2020).

4.2 Article 84 EPC

When compared with independent claim 3 of the main request, independent claim 3 of auxiliary request 2 has been amended by incorporation of the feature requiring that the first and second microimage element arrays are disposed "partially overlapping one another".

Independent claim 3 requires that the second microimage element array is "laterally offset from" the first microimage element array and that there is a

"transition" between the first and the second microimage element arrays aligned with the boundary region defined in the claim. It is not clear in this context what is meant by the fact that the two microimage element arrays are offset from each other and partially overlap each other, and in particular whether they "partially" overlap each other in the sense that they overlap only partially because they are offset, or in some other sense, for instance - as submitted by the appellant - in the sense that they overlap only in a section of the length of the claimed transition under the assumption that the transition forms a line or has an elongated shape. In addition, it is also unclear what is the relationship, if any, between, on the one hand, the partial overlap region of the two arrays defined now in the claim and, on the other hand, the mentioned transition and/or the boundary region defined in the claim. More particularly, and as submitted by the appellant, it is not clear whether the mentioned overlap region consists of the claimed transition, it is not even clear whether it is located within, or only in part of, the claimed transition and/or the claimed boundary region, or in a different region of the device.

The respondent's arguments according to which the claimed transition is an area formed by the offset arrangement of the two microimage element arrays and the amended feature only restricts the claimed subject-matter in the sense that this area is formed by a partial overlap between the two arrays are, in the board's opinion, not persuasive because the subject-matter actually claimed can be construed by the skilled person in this way, but also in other different ways as mentioned above.

The board therefore concludes that independent claim 3 is not clear (Article 84 EPC) and that, consequently, auxiliary request 2 is not allowable.

5. *Auxiliary request 3 - Independent claim 3*

5.1 Admission

The claims of auxiliary request 3 were submitted with the letter dated 6 August 2021 filed after the notification of the summons to the oral proceedings before the board. The claims comprise independent claims 1 and 10 identical to the corresponding claims 1 and 10 of the present main request, and independent claims 3 and 20 identical to the corresponding claims 3 and 20 of the fourth auxiliary request submitted with the letter dated 8 February 2019 filed in reply to the statement of grounds of appeal, these claims 3 and 20 corresponding to independent claims 1 and 15 of the seventh auxiliary request filed during the first-instance proceedings by letter dated 5 January 2018 further amended by incorporation of the respective limiting features of claims 3 and 20 of the present main request.

As submitted by the respondent, for independent claims 1 and 15 of the seventh auxiliary request filed during the first-instance proceedings to be re-submitted in appeal, the claims required the incorporation of the respective amendments of independent claims 3 and 20 of the present main request in order to comply with the prohibition of *reformatio in peius*. The board considered the resulting amended claims admissible under Article 12(4) RPBA 2007 (which is to be applied in the present case according to Article 25(2) RPBA 2020) because it could not be

expected from the respondent to draft amended claims during the first-instance proceedings taking into account all the possible subsequent outcomes of the case as well as the specific circumstances of a possible subsequent appeal for each of the possible outcomes, let alone to anticipate the possible consequences imposed by the prohibition of *reformatio in peius* in case a higher-order auxiliary request would have been found to be allowable by the opposition division and only the opponent would have filed an appeal.

The appellant did not object to the mentioned amendments required by the prohibition of *reformatio in peius*, but objected that independent claims 1 and 15 of the mentioned seventh auxiliary request filed during the first-instance proceedings did not converge with the claims of the higher-order auxiliary requests then on file, that for the same reason independent claims 3 and 20 of the fourth auxiliary request submitted in reply to the statement of grounds of appeal did not converge, and that for this same reason independent claims 3 and 20 of present auxiliary request 3 should not be admitted into the appeal proceedings. The board, however, was not persuaded by this objection of the appellant because claims 3 and 20 of the fourth auxiliary request submitted in reply to the statement of grounds of appeal corresponded, except for the mentioned amendments required to comply with the prohibition of *reformatio in peius*, to claims 1 and 15 of the seventh auxiliary request submitted during the first-instance proceedings and - leaving aside the issue already addressed in the former paragraph relating to the mentioned amendments required to comply with the prohibition of *reformatio in peius* - such claims shall be taken into account in accordance with

Article 12(4) RPBA 2007, irrespective of whether the subject-matter of the claims converge when compared with the subject-matter of the claims of other requests.

In addition, the fact that the independent claims of the present auxiliary request 3 result from a re-grouping of independent claims of previous requests filed in reply to the statement of grounds of appeal did not give rise to new substantive issues when compared with the corresponding independent claims of the mentioned previous requests, and in this respect similar comments as those set forth in point 3.1 above, second paragraph, in respect of the claims of auxiliary request 1 also apply to the claims of auxiliary request 3.

In view of these considerations, the board decided to admit auxiliary request 3 into the proceedings (Article 13(2) RPBA 2020, under consideration of Article 12(4) RPBA 2007).

5.2 Article 84 EPC

The appellant objected in respect of independent claim 3 that, in view of the two product-by-process features "a first print working" and "a second print working" included in the claim and defining the first and second arrays of microimage elements having different colours, it could not be discerned from the claimed device itself whether the two arrays constituted two different print workings or two portions of one single print working, and that for this reason the claim was not clear.

The respondent contested this view and submitted that the skilled person would understand that the microimage elements of the two arrays had a different colour and therefore constituted two separate print workings carried out one after the other with different colours, and that in the event that the two arrays having different colours were printed in one single printing step the problem of mis-registration between the two arrays considered in the patent specification would not arise.

The board notes that the claim is directed to a device having the two arrays respectively formed by the two mentioned product-by-process features. In this context it would, contrary to the respondent's submissions, generally not be discernible from the device itself whether the two arrays having different colours have been formed in one single multicolour printing step - for instance using, as submitted by the appellant, a print cylinder with different regions each transferring a different colour - or, as submitted by the respondent, in two successive printing steps each involving a different colour, let alone whether the device is or not specifically designed to avoid the visual effects caused by manufacturing mis-registrations when the two arrays are printed separately.

For these reasons, the board concludes that independent claim 3 is not clear (Article 84 EPC) and that, consequently, auxiliary request 3 is not allowable.

6. *Fourth auxiliary request - Admission*

The claims of the fourth auxiliary request were submitted during the oral proceedings before the board.

The claims of this request consist of the claims of the third auxiliary request after deletion of independent claim 3 and of the dependent claims only referring back to independent claim 3.

The appellant objected that the mentioned deletion of independent claim 3 directed to a device without deletion of the corresponding independent claim 20 of the third auxiliary request (i.e. independent claim 17 of the fourth auxiliary request) directed to the corresponding method of manufacture of the device resulted in a new amended request that required a treatment different from that of all the requests submitted during the proceedings, and that this constituted a new situation which would require an adjournment of the oral proceedings and would justify not admitting the amended request into the proceedings.

The board first notes that all the requests submitted by the respondent during the first-instance and the appeal proceedings and including a claim directed to a Moiré magnification device consistently included an independent claim directed to a method of manufacturing a Moiré magnification device resulting in a device comprising all the features of the device defined in the mentioned independent device claim. In addition, during the proceedings the appellant raised objections of lack of inventive step in respect of both the device claim and the corresponding method claim of each of the requests, submitted detailed arguments as to why the claimed device did not involve an inventive step, and submitted that analogous arguments also applied to the corresponding method claim without submitting detailed arguments as to why the method did not involve an inventive step. In these circumstances there was no

need for the appellant to submit detailed arguments in respect of the method claim because, as submitted by the appellant, in case the device would have been found to involve an inventive step, the same conclusion would have been valid for the method claim, and in case the device would have been found not to involve an inventive step, the request would not have been allowable irrespectively of the method claim, and in none of these cases a detailed assessment of inventive step of the method claim would have been necessary. However, a deletion of the device claim while retaining the corresponding method claim as in the case of the present fourth auxiliary request results in the appellant being confronted for the first time with a request including the method claim but not the corresponding device claim, and the admission of such an amended request into the proceedings would result in the appellant being confronted with a new situation requiring a detailed substantiation of the objection of lack of inventive step of the method claim that was not required for any of the requests previously submitted by the respondent during the proceedings. Furthermore, this new situation would possibly require an adjournment of the oral proceedings.

In addition, the fourth auxiliary request constituted an amendment to the respondent's appeal case within the meaning of Article 13(2) RPBA 2020 and no cogent reason was submitted by the respondent in support of exceptional circumstances that would justify the admission of the request into the proceedings under Article 13(2) RPBA 2020. In particular, the respondent's submissions that the method claim was already present in requests previously submitted and that the deletion of the device claim was a predictable reaction to the appellant's objections do not

constitute a cogent reason justifying, in the circumstances mentioned above, the submission of the fourth auxiliary request at such a late stage of the proceedings because, first, it is incumbent upon the patent proprietor to present in due time the requests to be considered and, second, an opponent is expected to submit detailed reasons why a request including a series of independent claims should not be allowed, but there is no need for the opponent to submit such detailed reasons for each of the independent claims of a same request.

In view of all these considerations, the board, exercising its discretion under Article 13(2) RPBA 2020, decided not to admit the fourth auxiliary request into the proceedings.

7. *Fifth auxiliary request*

7.1 Admission

The claims of the present fifth auxiliary request were submitted as ninth auxiliary request with the letter dated 6 August 2021 filed after the notification of the summons to the oral proceedings before the board, and the claims are identical to the claims of the fifth auxiliary request submitted with the letter dated 8 February 2019 filed in reply to the statement of grounds of appeal.

The appellant did not object to the admission of this request into the proceedings. In addition, the board saw no reason not to admit this request into the appeal proceedings because, first, the claims of the fifth auxiliary request dated 8 February 2019 consisted of the claims of the present main request after deletion

of independent claims 3 and 20 and of the dependent claims only referring back to them and, second, this request was in the board's view admissible under Article 12(4) RPBA 2007 in view of the fact that the deletion of the mentioned claims could - in the context of the claimed subject-matter and contrary to the situation of the fourth auxiliary request (*cf.* point 6 above) - not give rise to any new substantive issue, and the same applied to the claims of the present fifth auxiliary request (Article 13(2) RPBA 2020).

For these reasons, the board decided to admit the fifth auxiliary request into the proceedings (Article 13(2) RPBA 2020, under consideration of Article 12(4) RPBA 2007).

7.2 Amendments

Claims 1 to 16 of the fifth auxiliary request correspond respectively to claims 1, 2 and 6 to 19 of the third auxiliary request underlying the decision under appeal and considered allowable by the opposition division. Claim 1 results from the combination of claim 1 with dependent claims 2 and 4 as granted, independent claim 7 results from the combination of independent claim 15 with dependent claims 2 and 4 as granted, and claims 2 to 6 and 8 to 16 correspond in substance to claims 5, 11 to 14 and 16 to 24 as granted, respectively.

The amendments to the description of the patent specification according to the present fifth auxiliary request, i.e. pages 1 to 52 filed as ninth auxiliary request during the oral proceedings, relate to the adaption of its content to the invention as defined in the present claims (Rule 42(1)(c) EPC).

The board is therefore satisfied that the amendments to the patent as granted according to the appellant's fifth auxiliary request comply with the requirements of Articles 123(2) and (3) EPC.

7.3 Claim 1 - Novelty

It was undisputed during the appeal proceedings that, as held by the opposition division in its decision, the subject-matter of claim 1 is new over the state of the art considered during the proceedings.

In particular, the device defined in claim 1 is new over the device disclosed in document D9, and in particular over the embodiment disclosed in the document by reference to Fig. 5 (see also page 8, lines 5 to 16, page 9, lines 14 to 21, and page 12, lines 4 to 12), at least in that claim 1 further requires that the microimage element-free boundary region defined in the claim satisfies the following condition

(A) "the width of the microimage element-free boundary region is greater than the maximum pitch of either of the microimage element arrays".

Already for this reason the device of claim 1 is new over the device disclosed in document D9.

Therefore, the subject-matter of claim 1 is new over the documents of the prior art considered during the proceedings (Articles 52(1) and 54(1) EPC).

7.4 Claim 1 - Inventive step

7.4.1 The appellant submitted that the device defined in claim 1 was obvious in view of document D9 as closest state of the art.

The device of claim 1 differs from the device of document D9 at least in feature (A) mentioned in point 7.3 above. During the appeal proceedings the parties expressed different views as to whether the additional claimed feature

(B) "the first array of microimage elements is laterally spaced from the second array of microimage elements by a boundary region of non-zero width which is free of microimage elements, thereby giving rise to the interruption zone perceived by the viewer",

and in particular the presence of an interruption zone in the visual image perceived by the viewer, constituted a further distinguishing feature of the claimed device over the device of document D9. The board notes in this respect that distinguishing feature (A) imposes a further limitation to feature (B), and in particular to the size of the boundary region of non-zero width and therefore inherently also to that of the interruption zone perceived by the viewer and referred to in feature (B). Therefore, the relevant question for the issue of inventive step is whether the claimed combination of features - and in particular the combination of feature (A) with feature (B) - is rendered obvious by the prior art, irrespective of whether feature (B) taken in isolation is explicitly or implicitly disclosed in document D9 or, on the contrary, represents a further distinguishing feature.

7.4.2 As regards the question of the objective technical problem solved by the subject-matter of claim 1 over the closest state of the art constituted by the

embodiment disclosed in document D9 by reference to Fig. 5, the parties expressed different views. While according to the respondent the objective problem was to be formulated in terms of increasing the tolerance for manufacturing mis-registration between adjacent microimage element arrays, according to the appellant the objective problem was to be formulated in terms of introducing a visual separation between the magnified images generated by adjacent microimage element arrays.

7.4.3 As submitted by the appellant, the claimed invention results in the introduction of a visual separation between adjacent magnified images determined by the claimed microimage element-free boundary region. However, the formulation of the objective problem in terms of a visual separation of the magnified images already includes, as submitted by the respondent, a pointer to the claimed solution.

It is also noted that a lateral mis-registration between adjacent microimage element arrays may appear in both directions (i.e. a positive mis-registration causing overlapping between adjacent microimage element arrays, and a negative mis-registration causing a spacing between them, see Fig. 4(b) and 4(c) of the patent specification), and that there is no apparent reason why the skilled person, when considering the problem of mis-registration in the device of document D9, would consider dissociating the positive from the negative mis-registration and only addressing the first of them. That the appellant's formulation of the objective problem is based on hindsight is emphasised by the further appellant's submissions relating to the introduction of a boundary region for the purpose of compensating the unintentional visual overlapping of equidistant letters of a word visualised as disclosed

in document D9 (paragraph bridging pages 49 and 50, together with page 12, lines 4 to 12) - for instance, of the letters "A" and "B" visualised so as to compose the word "AB" with the device disclosed by reference to Fig. 5 of document D9 - and caused by mis-registration, without however addressing at the same time the fact that the boundary region would also introduce a further separation to the unintentional additional separation between letters of a same word that manufacturing mis-registrations may also cause.

The appellant also submitted in support of their formulation of the objective problem that, even assuming that there was no mis-registration between the microimage element arrays, the implementation of the mentioned disclosure of document D9 relating to the visualisation of a word such as "AB" may result in certain circumstances - for instance, when the device is tilted with respect to the viewer - in the two letters "A" and "B" being visually perceived close to each other to an extent such that only a partial section of the letter "A" would be visually perceived close to a partial section of the letter "B", resulting in an hybrid letter (see, for an analogous effect, Fig. 6b and 6c of document D2, together with page 50, lines 5 to 18), and that this problem would be solved by the claimed device.

However, the generation of such hybrid letters can be solved by a re-adjustment of the parameters of the device (for instance, by a change of magnification of the letters as a function of the relationship between the pitches of the microimage element arrays and the pitch of the micro-focusing element array, and/or by re-adjusting the relative position between the microimage element arrays and the micro-focusing

element array, etc.). In addition, the introduction of a physical separation between the two microimage element arrays corresponding to the letters "A" and "B" would then result (for instance, when the width of the separation is equal to an integer number times the pitch of the micro-focusing element array) in the two partial sections of the letters "A" and "B" in the mentioned hybrid letter being visually separated from each other, but not in each of the two letters being visually perceived in its entirety, so that this remaining problem would still require a re-adjustment of the parameters of the device as mentioned above. It follows that the problem of visually perceived hybrid letters mentioned by the appellant would generally not be solved by the mere introduction of the mentioned physical separation between microimage element arrays, i.e. by the claimed boundary region, and that consequently the claimed subject-matter does not constitute a solution to the problem formulated by the appellant.

In view of all these considerations, the board is of the opinion that the problem formulated by the appellant does not qualify in the context of the problem-solution approach as the objective problem solved by the claimed subject-matter.

7.4.4 As regards the objective problem formulated by the respondent, the board notes that by selecting an appropriate high-precision manufacturing technique from among the techniques known in the prior art - and in particular techniques as those referred to in the patent specification, paragraph [0085], last sentence, together with paragraph [0100], and in document D9, page 19, second paragraph, to page 20, first paragraph -, it would be possible, as submitted by the

appellant, to manufacture the device of Fig. 5 of document D9 with such a precision that there would be no substantial manufacturing mis-registration between the two microimage element arrays of the device - for instance, when sequentially printing each of the arrays in a different colour - causing a deterioration of the magnified image observable by the viewer (see patent specification, Fig. 4(a) to 4(c) together with the corresponding description). It follows that the claimed invention cannot be said to solve the problem of avoiding, in the mentioned extent, the visual effect caused by manufacturing mis-registrations of the device of document D9 because, as submitted by the appellant, the problem is already solved by the device of document D9.

However, among the known manufacturing techniques there are also low-precision techniques (in particular, the manufacture in more relaxed conditions involving, for instance, a faster manufacture with higher output and/ or a lower printing registration capability) which would not warrant the manufacture of the device of document D9 without the risk of introducing substantial mis-registrations affecting the quality of the whole observable magnified image. In addition, the provision of the claimed microimage element-free boundary region between adjacent microimage element arrays has the effect of allowing the manufacture of the device at higher rates with the high-precision techniques referred to above, and also with techniques having a lower precision, and - as emphasised by the respondent - with values of the array pitches lower than those considered appropriate in document D9 (page 19, second paragraph, to page 20, first paragraph), whereby a possible increase in the degree of mis-registration would not substantially affect the quality of the

observable magnified image. Therefore, in the opinion of the board the claimed subject-matter has the technical effect of allowing a less critical manufacture of the device without substantially compromising the quality of the observable magnified image associated with a possible mis-registration between adjacent image element arrays or, as submitted by the respondent, the technical effect of increasing the tolerance for mis-registration in the manufacture of the device (see patent specification, paragraphs [0008], [0010], and [0082] to [0087]).

The appellant submitted by reference to paragraphs [0045] and [0101] and to the disclosure of Fig. 10 (paragraphs [0128] and [0129]) of the patent specification that the registration error Σ had a predetermined value and that a solution to the problem considered by the respondent would require a width of the boundary region greater than the registration error; since claim 1 only required a width greater than the maximum pitch of either of the microimage elements arrays and the value of the maximum pitch could be smaller than the registration error Σ, the claimed subject-matter was insufficient to solve the problem formulated by the respondent. The board, however, does not find persuasive these arguments because, first, paragraph [0045] of the patent specification discloses a boundary region with a width greater than the registration error Σ only as a preferred or advantageous embodiment, second, neither claim 1 nor the problem formulated by the respondent require a complete compensation of mis-registrations between the microimage element arrays and, third, the fact that claim 1 does not require any relationship between the width of the claimed boundary region and the registration error Σ (see for instance patent

specification, paragraph [0012]), but only a width greater than the maximum pitch of the microimage element arrays, does not imply that the claimed invention would not, at least to some extent, compensate for mis-registrations and would not, at least to some extent, increase the tolerance for mis-registration in the manufacture of the device (see patent specification, paragraphs [0082] to [0087], together with paragraphs [0018] and [0045]).

The appellant also submitted that according to document D9 a relatively large pitch of the microimage element arrays allowed for a relatively high tolerance in the registration between the micro-focusing element array and the microimage element arrays when the arrays were superposed on each other and aligned by hand (paragraph bridging pages 18 and 19), that the possible effects due to misalignments between the micro-focusing element array and the microimage element arrays of the device of document D9 were bigger than those caused by printing misalignments of the microimage element arrays, and that for these reasons the problem formulated by the respondent was already implicitly solved in the device of document D9.

The board, however, cannot follow the appellant's submissions in this respect because, as submitted by the respondent, the optical effects of the different misalignments referred to by the appellant are of a different nature and are not comparable to each other. As an example, while a slight shift in the position of the micro-focusing element array of the device of document D9 relative to the microimage element arrays would generally shift the position of the whole visual image perceived by the viewer and would have no effect on the position of the visual image when the micro-

focusing element array is shifted along one of the axes of the array an integer number times the pitch of the micro-focusing array, a misalignment between the microimage element arrays in a direction such that the arrays partially overlap with each other would have the effect that the visual images generated by each of the two microimage element arrays would partially superpose on each other as shown in Fig. 4(c) of the patent specification.

In view of all these considerations, the board is of the opinion that the objective technical problem solved by the device of claim 1 starting from document D9 resides in increasing the tolerance for mis-registration between adjacent microimage element arrays in the manufacture of the device.

7.4.5 The appellant submitted that the person skilled in the technical field under consideration confronted with the objective problem would consider the introduction in the design of the device of a boundary region between the first and the second microimage element arrays as claimed having a width as also claimed in order to solve the problem, and that this approach did not require an inventive step.

However, there is no evidence on file in support of the approach referred to by the appellant, and in particular - as submitted by the respondent - none of the documents on file disclose the introduction of a physical separation between adjacent microimage element arrays as claimed.

In addition, as also submitted by the respondent, the skilled person would already see in the disclosure of document D9 relating to the provision of a relatively

large pitch for the microimage element arrays and to the use of specific manufacturing techniques (page 19, second paragraph, to page 20, first paragraph) a possible solution to the objective problem. Furthermore, as also submitted by the respondent, the skilled person would not consider in the specific context of document D9 the provision of a microimage element-free boundary region as claimed because this approach would require consideration of a physical separation between the microimage element arrays and such a separation would be at variance with the disclosure of document D9 relating to the provision of a uniform array structure for the whole of the microimage element arrays (paragraph bridging pages 10 and 11). The appellant contested this view and referred to Fig. 5 as disclosing a mis-alignment between the microimage element arrays of "A"'s and "B"'s. However, Fig. 5 is, as submitted by the respondent, only a schematic representation; in addition, the letters "A" and "B" shown in Fig. 5 of document D9 do not necessarily represent the array cells of the respective arrays, but the microimages within each of the respective cells, and the letters "A" and "B" may be differently positioned with respect to the background of the respective cells, so that the fact that the two-dimensional arrays of letters "A" and "B" represented in Fig. 5 might not be aligned with each other does not imply that the array cells containing the letter "A" are misaligned with respect to the array cells containing the letter "B" or that the respective arrays are misaligned with respect to each other. The further passage of document D9 in the second paragraph of page 12 refers to a plurality of regions of microimage arrays arranged adjacent to each other and, contrary to the appellant's view, this passage does not - at least

not clearly - deviate from the mentioned disclosure in the paragraph bridging pages 10 and 11 of document D9.

In view of the above considerations, the board concurs with the respondent's and the opposition division's view that the device of claim 1 does not result in an obvious way from the disclosure of document D9 and the evidence on file.

7.4.6 No other line of argument of lack of inventive step was submitted by the appellant in respect of the subject-matter of claim 1 of the fifth auxiliary request. Therefore, the subject-matter of claim 1 of the fifth auxiliary request involves an inventive step over the documents of the prior art considered during the proceedings (Articles 52(1) and 56 EPC).

7.5 Claims 2 to 16

As regards claims 2 to 16, the board notes that

- claims 4 and 6 are respectively directed to a security device and an article of value each including the device defined in claim 1,

- independent claim 7 is directed to a method of manufacturing a Moiré magnification device resulting in a device comprising all the features of the device defined in claim 1, and

- dependent claims 2 and 3 refer back to claim 1, dependent claim 5 refers back to claim 4, and dependent claims 8 to 16 refer back to independent claim 7.

Therefore, the subject-matter of claims 2 to 16 is also new and involves an inventive step for the same reasons given in points 7.3 and 7.4 above in respect of claim 1 (Articles 52(1), 54(1) and 56 EPC).

8. In view of the above considerations, the board concludes that the patent as amended according to the fifth auxiliary request meets the requirements of the EPC within the meaning of Article 101(3)(a) EPC and that, therefore, the patent is to be maintained as amended according to the fifth 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 as amended in the following version:

- Claims: No. 1 to 16 according to the fifth auxiliary request, filed as auxiliary request 9 with the letter dated 6 August 2021.
- Description: Pages 1 to 52 filed as ninth auxiliary request during the oral proceedings held on 6 October 2021.
- Figures: Sheets 32 to 64 of the patent specification.

The Registrar: The Chairman:

H. Jenney R. Bekkering

Decision electronically authenticated