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Datasheet for the decision of 29 September 2017

Case Number: T 1394/15 - 3.2.05

Application Number: 07789190.1

Publication Number: 2054242

IPC: B42D25/00

Language of the proceedings: EN

Title of invention:
Photonic Crystal Security Device

Patent Proprietor:
De La Rue International Limited

Opponents:
Bundesdruckerei GmbH
PPG Industries Ohio, Inc.

Relevant legal provisions:
EPC 1973 Art. 54(1)

Keyword:
Experimental data: not taken into account
Novelty (no; all requests on file)

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Case Number: T 1394/15 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 29 September 2017

Appellant: (Opponent 1)	Bundesdruckerei GmbH Oranienstr. 91 10969 Berlin (DE)
Representative:	Patentanwälte Bressel und Partner mbB Potsdamer Platz 10 10785 Berlin (DE)
Respondent: (Patent Proprietor)	De La Rue International Limited De La Rue House, Jays Close, Viables Basingstoke, Hants RG22 4BS (GB)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)
Party as of right: (Opponent 2)	PPG Industries Ohio, Inc. 3800 West 143rd Street Cleveland, OH 44111 (US)
Representative:	f & e patent Fleischer, Engels & Partner mbB, Patentanwälte Braunsberger Feld 29 51429 Bergisch Gladbach (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 8 June 2015 concerning maintenance of the European Patent No. 2054242 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 decision of the opposition division on the amended form in which European patent No. 2 054 242 could be maintained.

II. The opposition division *inter alia* considered document D4 (US 2005/0228072 A1).

In response to the board's communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), the respondent filed a "Report of Experiments", which will be referred to as "the Report" in what follows.

III. The oral proceedings before the board took place on 29 September 2017, in the absence of the party as of right (opponent 2).

IV. The appellant (opponent 1) requested that the decision under appeal be set aside and the patent revoked.

The respondent (patent proprietor) requested that the appeal be dismissed, or that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the sets of claims filed with the letter dated 29 August 2017 as main and auxiliary request 4. (Auxiliary requests 1-3 and 5-9 were withdrawn in the course of the oral proceedings.)

The party as of right (opponent 2) filed no requests.

V. The independent claims of the main request read as follows (for claim 1, the feature references used by the board are indicated in square brackets):

"1. [**1**] An optically variable security device [**2**] comprising a photonic crystal for which [**3**] incident light received by the crystal is selectively reflected or transmitted by the crystal to generate a first optically variable effect observable over a first set of directions and [**4**] incident light received by the crystal is selectively reflected or transmitted by the crystal to generate an optical effect observable over a second set of directions that is different from the first set and wherein [**5**] the first and second sets of directions lie in different planes which intersect to define the normal to the crystal surface."

"15. A security document comprising a security device according to any of the preceding claims wherein the security device is adhered to or substantially contained within the security document."

Claim 1 of the fourth auxiliary request differs from claim 1 of the main request in that "an optical effect" has been replaced by "a second optically variable effect", the word "and" before "wherein" has been replaced by a comma, and by the additional features "wherein [**6**] the second optically variable effect is different from the first optically variable effect and wherein [**7**] the photonic crystal has a full or partial band gap which does not have rotational symmetry about the normal to its surface".

Claim 13 is identical to claim 15 of the main request.

VI. The appellant (opponent) argued as follows:

(a) Claim interpretation

Claim 1 does not require the different optical effects to be obtained at the same elevational angle in the different planes. The interpretation of feature 7 based on the first sentence of paragraph [0016] is not helpful because it is not clear how a full photonic band gap can be said not to have rotational symmetry about the normal to the crystal surface.

(b) Relevance of the Report

The appellant was surprised by the late filing of the Report; considering the little time left between the transmission of the Report and the oral proceedings, the appellant was not able to check all the information contained in the document.

The appellant did not question the correctness of the statements of the author of the Report, but pointed out that it was not clear what exactly was being shown and which objects were actually being compared. The origin of the samples is not disclosed, for reasons that remain mysterious. This fact makes it impossible for the appellant to carry out counter-experiments. Moreover, the inventor has not explained whether the materials used were already available at the priority date. Possibly the reason for refusing to disclose the origin of the material is to be found in the fact that the product was already available for sale at the priority date and that, if its manufacturer also

produced security documents, the claimed subject-matter could not be novel any more.

Moreover, the illumination of the samples was diffuse, which is inappropriate for illustrating directed reflection.

Also, the pictures have been chosen such that they appear to demonstrate the absence of the claimed effect for the sample according to document D4; possibly an appropriate selection would have allowed to demonstrate the contrary. Unfortunately, no complete set of rotations is shown. Incidentally, some of the results show that even with a sample according to the patent there is rotational symmetry for certain directions.

The appellant noted that some of the apparent colours (in particular brownish colours) are no spectral colours. The appellant explained this as evidence for the absence of any partial band gap in this direction, resulting in the body colour (due to nano-particles) becoming visible. This might also be the reason why no directional light source was used: it would become apparent that there is no reflection.

The report does not explain how exactly the samples according to the patent are structurally different. Possibly the spectral behaviour of the crystal was appropriately shifted by using a different sphere size or a different matrix material, so that the colour change was not apparent at the particular angles chosen.

Moreover, it has to be noted that the effect does not have to be apparent in visible light; it could also occur in the region of infrared or ultraviolet light.

(c) Novelty of the main request

Claim 1 lacks novelty over document D4. There is no doubt that document D4 discloses a photonic crystal and that the optical effect depends on the direction of observation (paragraph [0012]). This dependency is due to the intrinsic structure of the crystal. In a direction with a full band gap, there is no transmission. The skilled person, who is a solid state physicist, knows what a band gap is and that when a band gap closes in one direction, transmission can be observed in certain directions whereas in another direction (at the same elevational angle) the light is still reflected. Consequently, there have to be two planes: one in which there is transmission, and another in which there is no transmission. One can, therefore, always construe planes according to feature 5. Thus document D4 is intrinsically novelty-destructive for the subject-matter of claim 1. The same holds true for reflection.

If a material had a complete bandwidth gap at all wavelengths, it would be a perfect reflector. No such material has been discovered so far.

(d) Novelty of auxiliary request 4

The request does not contain any new technical feature. The subject-matter of claim 1 lacks

novelty over document D4 for the same reasons as claim 1 of the main request.

VII. The respondent argued as follows:

(a) Claim interpretation

Feature 7 was introduced to clarify the subject-matter and its distinction over the prior art, where one single plane is being considered. Its basis is found, for instance, in the first sentence of paragraph [0016] of the patent. The feature corresponds to one among several possible ways of expressing the fact that the photonic band gap does not have rotational symmetry about the normal to the crystal surface, meaning that if the crystal is rotated, a different effect is observed. That the first and second optical effects are being observed at the same elevational angle is inherent in claim 1. The core of the invention lies in the rotational dissymmetry of the colour effects.

(b) Relevance of the Report

There is no trickery behind the data presented in the Report. The colours do occur as shown. The appellant could have provided counter-evidence but has chosen not to do so.

The representative of the respondent explained that to his best knowledge, there were no nano-particles in the sample; but even if there were, they would be present in both samples.

The origin of the samples is commercially sensitive and subject to agreements between the respondent and the supplier. There is strong competition in this field of technology. It is correct that it is not disclosed what exactly is being compared, but if the inventor's statement is accepted as correct, then it supports the respondent's position.

It was not possible to use a point source, but the conditions chosen are reasonably close to a directional light source.

(c) Novelty of the main request

Claim 1 does not lack novelty over document D4. The materials disclosed in document D4 do not exhibit the optical effects claimed.

The argument of the appellant is quite an extrapolation of one single sentence in document D4. The only relevant part of document D4 is paragraph [0012], which only says that the object of the invention is to provide mouldings which simultaneously have a colour effect which is dependent on the viewing angle. So actually only the existence of an optically variable effect is disclosed. The appellant is unable to see how this can be extrapolated in the way proposed by the appellant. The respondent has a fundamentally different understanding of how the material according to document D4 works.

(d) Novelty of auxiliary request 4

Document D4 does not disclose different optically variable effects, nor does it disclose the claimed rotational dissymmetry.

Reasons for the Decision

1. The application on which the patent is based was filed on 10 August 2007. According to Article 7 of the Act revising the EPC of 29 November 2000 (OJ EPO 2007, Special edition No. 4, 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 (OJ EPO 2007, Special edition No. 4, 219), Article 54 EPC 1973 applies in the present case.

2. Claim interpretation

Claim 1 as granted comprises features 1 to 4. In the course of the opposition proceedings, the respondent introduced feature 5, which requires the first and second sets of directions to lie in different planes which intersect to define the normal to the crystal surface. According to the respondent, feature 5 was introduced to distinguish the invention over the prior art security devices, in which optical variability is obtained by tilting the crystal.

The respondent explained that feature 5 was one possible way of expressing the teaching of the first sentence of paragraph [0016] of the patent, which reads as follows:

"Photonic crystal materials suitable for use with the invention are those where the exhibited full or partial photonic bandgap does not have rotational symmetry about the normal to its surface." (underlining by the board)

It is not immediately clear which surface is being referred to in this passage. A reference to the surface of the band gap appears not to be technically meaningful. The surface could be the surface of the invention, invention being understood as the security device according to the invention, but this interpretation seems rather unnatural. If the drafter had meant the surface of the security device, he would have said so and would not have referred to the invention in general terms. Also, paragraph [0016] concerns the materials as such, irrespective of the substrate on which they are to be provided. Considering the sentence as a whole, the board is of the opinion that the surface of the crystal materials is meant - although this interpretation is problematic from a grammatical point of view ("it" being understood to refer to a preceding plural noun). The respondent explained this discrepancy as the result of a "grammatical oversight in the drafting" (Response to the communication of the board, dated 29 August 2017, page 3, last sentence). Considering the above, the board understands the first sentence of paragraph [0016] to mean that the band gap varies as the crystal is rotated about the normal to one of its surfaces.

The board understands feature 5 as a *bona fide* attempt to formulate the fact that the optical effect observed varies when the crystal is rotated about the normal to its surface. This normal and the direction of

observation define a plane; if the situation before and after the rotation is considered, there are two planes, the intersection of which is the normal to the crystal surface.

The addition of feature 5 raises clarity issues; in particular, the question arises how the first and second sets of directions mentioned in features 3 and 4 relate to the two planes, i.e. whether the variation of the optical effect variation can be observed at virtually all elevational angles (that is, except 90°) or not. However, the board notes that the appellant did not raise an objection of lack of clarity.
The respondent explained that the "different planes" of claim 1 do not only comprise but actually constitute "the first and second sets of directions". The board adopts this understanding of the subject-matter of claim 1 in what follows.

3. Relevance of the Report

The Report filed by the respondent raises a number of questions, the most important of which is the precise nature of the comparative samples used. The Report only states that the 'claimed sample' is identical to the sample according to document D4 but differs structurally from it. These statements are so vague that even if the appellant had had enough time to perform experiments in order to check the accuracy of the results presented, it could not have done so in a meaningful way.

Therefore, the board has decided not to take account of the Report.

4. Main request: Novelty

The opposition division found claim 1 to differ from the disclosure of document D4 by feature "F11", which corresponds to features 4 and 5 as defined in point V. above. The discussion during the oral proceedings before the board was centered on whether document D4 actually disclosed feature 5.

As explained in point 2. above, feature 5 expresses the teaching of the first sentence of paragraph [0016] of the patent, according to which photonic crystal materials suitable for use with the invention are those where the exhibited full or partial photonic band gap does not have rotational symmetry about the normal to its surface. When such materials are used, the surface will appear to change colour on rotation for an arbitrary elevational angle (as disclosed in paragraph [0016], fourth sentence, considering that the skilled person would have understood that the reference to an azimuthal angle in this sentence must be replaced by a reference to the elevational angle).

The board endorses the argument of the appellant according to which real photonic crystals do not have a full band gap for all wavelengths; to the best knowledge of the board, photonic crystals behaving as perfect mirrors have not been discovered so far. Therefore, any real photonic crystal, such as the one used in document D4, must be expected to have planes in which light of some wavelength is transmitted as well as planes in which the same light is reflected.

In view of the teaching of paragraph [0012] of document D4, which discloses that the photonic crystal allows to obtain "a colour effect which is dependent on the

viewing angle", the skilled person trying to reduce the teaching of document D4 to practice would arrange the photonic crystal such that this effect is actually achieved. Document D4 is silent on whether the optical effect is to be achieved for azimuthal angle variation (i.e. by rotating the security device) or elevational angle variation (i.e. by tilting the security device), but the skilled person would understand that both approaches may be equally useful for improving the security of the device. The skilled person wishing to reduce the teaching of document D4 to practice by following the first path (so as to obtain optically variable effects that can be observed by rotating the security device) would necessarily arrange the photonic crystal such that the plane(s) in which light of some wavelength is transmitted as well as the plane(s) in which the same light is reflected are arranged such that they intersect to define the normal to the crystal surface. Consequently, he would obtain an optically variable security device having feature 5 in addition to features 1 to 4.

Therefore, document D4 implicitly discloses the subject-matter of claim 1.

In point 6.1.2 of its decision, the opposition division had rejected this approach in particular because the appellant (then opponent 1) had also presented arguments based on the assumption that the photonic crystal of document D4 had rotational symmetry, thereby contradicting itself. Before the board, the appellant has consistently argued that the photonic crystal of document D4 did not have rotational symmetry. Moreover, this assertion is both plausible on theoretical grounds and supported by the concrete examples cited in the decision under appeal. Therefore, the board has reached

the conclusion that the objection of self-contradiction cannot be upheld against the appellant.

As a consequence, the main request has to be dismissed.

5. Auxiliary request 4

Claim 1 differs from claim 1 of the main request in that the second optical effect has to be an optically variable effect, and by the additional features 6 ("the second optically variable effect is different from the first optically variable effect") and 7 ("the photonic crystal has a full or partial band gap which does not have rotational symmetry about the normal to its surface").

In its argumentation regarding feature 5, the respondent has argued that this feature was disclosed in the first sentence of paragraph [0016] of the patent, which actually recites feature 7. It follows that features 5 and 7 express the same feature using different wording. Consequently, the finding that document D4 discloses feature 5 necessarily entails that document also discloses feature 7: feature 7 cannot, therefore, distinguish the subject-matter of claim 1 from the disclosure of document D4.

Moreover, the fact that document D4 discloses feature 5 necessarily means that the second effect observed with the photonic crystal of document D4 is an optically variable effect. This second optically variable effect has to be different from the first optically variable effect; otherwise it would not be possible to see that there is more than one optical effect.

Therefore, the board has reached the conclusion that the additional features do not further distinguish the claimed subject-matter over the disclosure of document D4.

As a consequence, claim 1 of auxiliary request 4 lacks novelty over document D4, so that auxiliary request 4 has to be dismissed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

N. Schneider M. Poock

Decision electronically authenticated