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**Datasheet for the decision
of 15 March 2016**

Case Number: T 1175/11 - 3.4.01

Application Number: 00110404.1

Publication Number: 1158459

IPC: G06K19/14, G07D7/12

Language of the proceedings: EN

Title of invention:

Method, device and security system, all for authenticating a marking

Patent Proprietor:

SICPA HOLDING SA

Opponent:

Bundesdruckerei GmbH

Headword:

Relevant legal provisions:

EPC Art. 123(2)
EPC 1973 Art. 54(1), 54(2), 56
EPC R. 80, 103(1)(a)

Keyword:

Amendments - allowable (yes)

Novelty - (yes)

Inventive step - (yes)

Reimbursement of appeal fee - (no)

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1175/11 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 15 March 2016

Appellant: Bundesdruckerei GmbH
(Opponent) Oranienstr. 91
10969 Berlin (DE)

Representative: Keil & Schaafhausen
Patent- und Rechtsanwälte PartGmbB
Friedrichstrasse 2-6
60323 Frankfurt am Main (DE)

Respondent: SICPA HOLDING SA
(Patent Proprietor) Avenue de Florissant 41
1008 Prilly (CH)

Representative: Hoffmann Eitle
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
1 March 2011 concerning maintenance of the
European Patent No. 1158459 in amended form.

Composition of the Board:

Chairman G. Assi
Members: T. Zinke
C. Schmidt

Summary of Facts and Submissions

- I. The appeal, filed on 28 April 2011, lies from the interlocutory decision of the opposition division, posted on 1 March 2011, maintaining European patent Nr. 1 158 459 in amended form according to a first auxiliary request. The appeal fee was paid on the same date. The statement setting out the grounds of appeal was filed on 11 July 2011.
- II. In its decision, the opposition division concluded that independent claim 8 of the patent as granted (main request) lacked novelty as compared to document E1 (WO-A-2000/19428). With regard to a first auxiliary request, the opposition division found that amended claim 8 respected Article 123(2) EPC and that independent claims 1 and 8 were both novel as compared to documents E1 and E6 (RU-C-2 112 957, in the following all references to document E6 being based on the German translation provided by the appellant) and involved an inventive step starting from either one of documents E1 or E2 (GB-A-2 095 822) and considering that the skilled person would not take into account document E8 (EP-A-0 072 237).
- III. With the appeal, the appellant (opponent) requested that the interlocutory decision be set aside and the patent be revoked in its entirety.

Oral proceedings were requested as an auxiliary request.

With the statement setting out the grounds of appeal, the appellant argued that the amendments to independent claim 8 did not respect Article 123(2) EPC, this also applying to claim 15. Further, the appellant argued

that claims 1, 8 and 15 were not novel over E1 and E6. Additional arguments were brought forward with regard to a lack of inventive step of claims 1, 8 and 15 starting from document E2 and taking into account document E8.

Furthermore, the appellant argued that a violation of its right to be heard (Article 113(1) EPC 1973) occurred because the decision did not give any comments on claim 15. In a further letter dated 22 April 2015, the appellant considered this as a substantial procedural violation and requested reimbursement of the appeal fee.

- IV. The respondent (patent proprietor) requested by letter of 29 November 2011, as a main request, that the appeal be dismissed and the patent be maintained in the amended form in which it was maintained in the opposition proceedings.

The respondent also requested that the patent be maintained on the basis of amended claim sets as filed with this letter according to a first or a second auxiliary request, respectively.

As a further auxiliary request, the respondent requested oral proceedings.

In its letter the respondent provided arguments against the objections raised by the appellant and the alleged violation of the appellant's right to be heard.

Furthermore, the respondent discussed the amendments made to the claims of the first and second auxiliary requests with regard to Article 123(2), (3) EPC and made submissions with regard to Articles 54(1), (2) and 56 EPC 1973.

- V. By letter of 22 April 2015, the appellant disagreed with the respondent's arguments and made further submissions.
- VI. By summons of 22 September 2015 the parties were summonsed to oral proceedings due to take place on 15 March 2016. A Board's communication under Article 15(1) RPBA was issued on 9 February 2016 drawing attention to the issues to be discussed during oral proceedings.
- VII. By letter of 29 February 2016, the appellant further commented on the issues of novelty of claims 1 and 8 of the respondent's main request as compared to the disclosures of documents E1 and E6, respectively. Further arguments were provided with regard to Article 123(2) EPC for claim 8 of the main request. It was further argued that the amendments to claim 8 of the respondent's main request did not respect Rule 80 EPC. With regard to the respondent's second auxiliary request, the appellant argued that claims 1 and 6 were not based on an inventive step.
- VIII. The respondent provided further arguments by letter of 29 February 2016 with regard to novelty of claims 1 and 8 of the main request as compared to documents E1 and E6. Furthermore, the respondent discussed the merits of the amended features of the claims of the first auxiliary request as compared to the prior art documents E1, E2, E6 and E8.
- IX. Oral proceedings were held as scheduled on 15 March 2016. During the oral proceedings the appellant filed two graphs concerning the comparison of

functions according to document E1 and the patent in suit.

The appellant's final request was that the decision under appeal be set aside, the patent be revoked and the appeal fee be reimbursed.

The respondent's final requests were that the appeal be dismissed (main request), or, alternatively, that the patent be maintained in amended form on the basis of the claims of the first or the second auxiliary request, submitted with the letter dated 29 November 2011.

At the end of the oral proceedings, the decision of the Board was announced.

X. Claim 1 of the respondent's main request reads as follows, wherein the denomination of features as proposed by the appellant and adopted by the respondent is put between square brackets:

"1. Method for authenticating a luminescent probe marking (M-P), comprising the steps of:

[A] exciting said luminescent probe marking (M-P) with at least one excitation pulse (P) of at least one excitation source (3, 31 - 36),

[B] measuring probe intensity values ($V_{P1} - V_{Pn}$) of emission intensity (I) from emission radiation (E) of said luminescent probe marking (M-P) in response to said at least one excitation pulse (P) at time intervals ($t_1 - t_n$),

[C] forming a probe intensity-versus-time emission

function of said probe intensity values ($V_{P1} - V_{Pn}$),

- [D] *comparing said probe intensity-versus-time emission function with at least one reference intensity-versus-time emission function,*
- [E] *said probe intensity-versus-time emission function and said reference intensity-versus-time emission function are normalized prior to comparison."*

Independent claim 8 of the respondent's main request reads as follows:

"8. Device for authenticating a luminescent probe marking (M-P), comprising:

- [F] *at least one detector (4, 41, 42, 4b) adapted to measure probe intensity values ($V_{P1} - V_{Pn}$) of emission intensity (I) from emission radiation (E) of said luminescent probe marking (M-P) in response to at least one excitation pulse (P) generated by at least one excitation source (3, 31 - 36) at time intervals ($t_1 - t_n$),*
- [G] *at least one processor (1) adapted to form probe intensity-versus-time emission function of said probe intensity values ($V_{P1} - V_{Pn}$),*
- [H] *at least one processor (1) adapted to compare said probe intensity-versus-time emission function with at least one reference intensity-versus-time emission function and*
- [I] *at least one processor (1) adapted to normalize said probe intensity-versus-time emission function*

prior to comparison with a normalized reference probe intensity-versus-time emission function."

Claim 15 of the respondent's main request reads:

"15. Security system for authenticating a luminescent probe marking (M-P), comprising:

[J] a device according to one of claims 8 to 14,

[K] at least one reference sample (7-R) comprising at least one luminescent reference marking (M-R) for measuring reference intensity values ($V_{R1} - V_{Rn}$) of emission intensity (I) at time intervals ($t_1 - t_n$) for at least one wavelength of the emission radiation (E) of said luminescent reference marking (M-R) and

[L] at least one probe sample (7-P) comprising at least one luminescent probe marking (M-P) for measuring probe intensity values ($V_{P1} - V_{Pn}$) of emission intensity (I) at time intervals ($t_1 - t_n$) for at least one wavelength of the emission radiation (E) of said luminescent probe marking (M-P)."

XI. The claims of the respondent's first and second auxiliary request are not relevant for this decision.

Reasons for the Decision

1. The appeal is admissible.
2. Respondent's main request

2.1 Article 123(2) EPC, Rule 80 EPC

2.1.1 In appeal proceedings, the appellant held that the replacement of the wording "*detector for ...*" with "*detector adapted to ...*", as carried out during opposition proceedings in claim 8 of the current respondent's main request, did not respect Article 123(2) EPC. The appellant underlined the fact that the disclosure on page 14, line 1 to page 16, line 2 of the application as originally filed could not be regarded as a basis for this amendment because only a particular detector based on a GaAsP photodiode was described, no further detectors being disclosed. Moreover, should the wordings "*detector for ...*" and "*detector adapted to ...*" be considered to describe the same technical subject-matter, said replacement would then not be allowable under Rule 80 EPC.

2.1.2 According to the respondent, claim 8 as originally filed mentioned a "*detector for measuring probe intensity values*". It was argued that a "*detector for ...*" should be regarded as a detector de facto adapted to perform the desired detection, so that the replacement could be seen as describing the same technical subject-matter. The respondent also cited further passages of the originally filed description (cf. page 19, 2nd paragraph; page 20, 2nd paragraph), where photodetectors are mentioned in general terms, without any particular reference to a GaAsP photodiode.

2.1.3 It is worth mentioning that during opposition proceedings the discussion rather concerned the replacement of "*processor for ...*" with "*processor adapted to ...*" in claim 8. Such an amendment was considered necessary by the opposition division in order to distinguish between a general purpose

processor that still had to be adapted to perform the claimed function and a processor that could de facto, due to the hardware or the installed software, perform the claimed function.

2.1.4 The Board thus holds that, with regard to a processor, the expression "*processor for ...*" would not necessarily be equivalent to "*processor adapted to ...*" due to the need for programming the processor so as to make it suitable for carrying out the desired function. On the other hand, with regard to a detector, the wording "*detector for ...*" would quite clearly imply the fact that the detector has to be adapted to detect the intended physical parameter, otherwise the term "*detector*" would be void of meaning. In this respect, the appellant did not provide any example for a detector that, although being suitable "*for measuring*" a parameter, would not at the same time be also "*adapted to measure*" said parameter. The Board therefore concludes that the amendment of "*detector for measuring ...*" a parameter into "*detector adapted to measure ...*" said parameter would have not been necessary. Anyhow, such an amendment does not contravene Article 123(2) EPC since both terms describe the same technical subject-matter.

2.1.5 According to Rule 80 EPC, claims of a patent may be amended, provided that the amendments are occasioned by a ground for opposition under Article 100 EPC. During opposition proceedings, novelty of the feature "*detector for measuring probe intensity values...*" of originally granted claim 8 was discussed with regard to the disclosure of documents E1 and E6 (cf. sections III.1.2 and III.1.5 of the opposition document and section 4 of the minutes dated 1 March 2011). It is the Board's understanding that the appellant filed the

amendments in the then pending first auxiliary request (the current main request) as an attempt to overcome the raised novelty objection. The Board holds that any amendment should be allowed under Rule 80 EPC, provided that it can be considered as a serious attempt to overcome a ground for opposition. Hence, the amendment is allowable under Rule 80 EPC.

2.2 Novelty (Article 54(1), (2) EPC 1973)

2.2.1 Document E1

Document E1 (cf. abstract) discloses a latent illuminance discrimination marker. A light source illuminates the marker which then emits phosphorescence. A photosensor detects the emitted illuminance and the decay time is determined. The decay time is checked to provide identification of different types or generations of data storage cartridges. Alternatively, it provides a secure keying mechanism for authorized access to proprietary software.

Claim 1

Feature A

There was no dispute about the appellant's observation that feature A was disclosed in document E1.

Feature B

In the appealed decision (cf. Reasons, section 3.4.1), the opposition division concluded that document E1 did not disclose feature B.

With the statement setting out the grounds of appeal (cf. section 2.1), the appellant argued that according to document E1 (cf. Figure 3C and page 9, line 1 to page 10, line 5) the decay time between 90% and 60% as well as between 60% and 33% of the initial value was determined. In order to achieve this, it would be necessary to determine, i.e. to measure, whether the intensity of the emission crossed the predetermined thresholds (cf. 3.6 V, 2.4 V and 0.4 V, the Board, however, noting that the value of 0.4 V is mentioned in E1 in correspondence with 10 % of the initial value (cf. page 9, lines 6 to 8)). Hence, when carrying out the disclosed method in order to detect whether the thresholds were crossed, the intensity had to be measured in regular time intervals. Moreover, it had to be determined, whether the predetermined intensity thresholds were already reached.

On the other hand, the respondent distinguished between measuring intensity values at predetermined points in time (as in the patent in suit) and measuring time intervals at predetermined intensity values (as in document E1). The respondent further argued that feature B had to be read together with feature C, concerning the step of forming a function of the probe intensity values. In this respect, in order to obtain a complete function, a plurality of measurements was necessary, not only two, sufficient to determine a decay time.

According to the Board's understanding, the formation of intensity-time value pairs requires the measure of both intensity values and time values, although it may be possible that some values are "*predetermined*" in the sense that they are not measured. The claim wording alone, however, does not provide a basis for the

respondent's understanding that the time intervals are all predetermined so that there would be no need to actually measure them. Rather, the claim wording implies that both times and corresponding intensity values have to be measured. Moreover, the understanding that the determination of the intensity values in document E1 implies measuring would result from the fact that it is checked when the intensity crosses a predetermined threshold. This would not be possible without measuring the intensity.

Hence, feature B is disclosed in document E1.

Feature C

According to the appellant, feature C was disclosed in document E1, since the relative intensity values such as 90%, 60% and 33% of the initial intensity value were related to the measured times t_0 , t_1 and t_2 , at which the relative intensity thresholds were reached (cf. E1, Figure 3C and page 9, lines 1 to 8). With regard to the in the claim wording unspecified number of points that were needed to form the function, the appellant referred to page 12, lines 7 to 11 of E1 (cf. "... , or fall through multiple thresholds, ..."), which would disclose a plurality of intensity-time value pairs that formed the function. Also, the applicability to non-exponential decays was disclosed on page 9, lines 16 to 18.

The respondent stated that according to claim 1 the intensity-versus-time function was formed once the intensities were measured. This resulted from the formulation of feature C "*forming a probe intensity-versus-time emission function of said probe intensity values*", implying that all intensity values had been

measured beforehand. This, however, was not the case in E1, which neither disclosed such a separate measuring step nor any association of intensity with time. Furthermore, feature C had to be interpreted as providing a complete function resulting from a plurality of intensity-time value pairs, so that a particular curve shape could be identified. According to document E1, however, only determined time constants could be determined rather than a "complete" intensity-time function. Moreover, the method of E1 was not able to deal with non-exponential decays, but needed a model for the decay. Only with such a model the measurement of time constants was sufficient to compare decay curves based on the same model.

The Board considers feature C as being formulated so broadly that the method as described in document E1 is covered. A "function" relates the value of a first parameter, for example intensity, to the corresponding value of a second parameter, for example time. Thus, a "probe intensity-versus-time emission function" is "formed" by at least two value pairs. In document E1, emission intensity differences (90%-60%) and corresponding time differences (t_2-t_1) are measured. However, such intensity differences related to corresponding time differences would fall under the generic term "probe intensity-versus-time emission function of said probe intensity values", since intensity differences can be regarded as intensities and time differences as times. It should be noted that the number of value pairs and, therefore, the accuracy of the obtained function is not specified in the claim wording, so that the example disclosed on page 9, lines 23 to 26, of E1 would fall under the scope of feature C.

Hence, feature C is disclosed in document E1.

Features D and E

With regard to features D and E, the appellant argued that in document E1 (cf. page 9, lines 10 to 13) the determined decay time of the probe was compared with the decay time of a reference. As the decay time was a parameter of a function, the comparison of the respective decay times implied that the functions were compared, so that feature D was known in this respect. Moreover, according to E1 (cf. page 9, lines 1 to 7, lines 19 to 26 and page 8, line 18), the thresholds were normalized to initial values, taken as 100 %, so that the probe intensity-versus-time function was also normalized. Since in feature E it was only stated that the normalization was performed prior to comparison, it would not be necessary that the normalization took place after the complete function was formed. In E1 (cf. page 12, lines 12 to 15) the normalization could be achieved prior to the measurement by calculating the thresholds based on the initial intensity value. With regard to the reference intensity-versus-time emission function, the appellant argued that such a reference function had to be measured by the same method as the probe, because otherwise the influence of other parameters could not be taken into account. Since the apparatus of E1 automatically normalized the function when determining decay times, also the reference intensity-versus-time emission function was normalized. For further supporting its argumentation, the appellant, during the oral proceedings before the Board, provided two graphs concerning the comparison of functions according to E1 and the patent in suit. The appellant explained that the method of document E1 would be comparing normalized probe and reference

emission functions as claimed in claim 1, whereby the alleged difference of comparing decay times instead of intensity values was not reflected in the claim wording. Hence, features D and E were disclosed in E1.

The respondent argued that the order of steps as defined in claim 1 was not disclosed in document E1. The probe intensity-versus-time function would be first formed (cf. feature C) and then normalized (cf. feature E) for carrying out the comparison (cf. feature D). This order was not present in E1, since in E1 the normalization took place before the decay time was measured. Moreover, the respondent held that, according to feature D, complete functions were compared and not only decay times. This resulted in comparing curve shapes and not intensity values of individual measurements, as expressed e.g. in paragraph [0016] of the present patent specification as published (cf. B9 version). Thus, the present invention (cf. paragraph [0029]) was *"model-free, i.e. that the luminescence decay curve itself is used as the authenticating feature, rather than a parameter derived thereof."* As a difference, according to E1 (cf. page 9, lines 10 to 13), a comparison was only made with a predetermined decay time, which, however, was not a reference emission function. The respondent also submitted that the graphs submitted by the appellant in the oral proceedings were misleading, since nowhere in document E1 a corresponding graph and an association of intensity with time was shown.

The Board agrees with the respondent that document E1 does not disclose a reference intensity-versus-time function to be compared with a probe intensity-versus-time function (cf. feature D). The *"predetermined decay time"* (cf. page 9, line 11), with which the measured

decay time is compared, is clearly not a function, but only a time. It might be that this predetermined decay time actually resulted from measurements of references, but this is not disclosed in E1. The origin of the "*predetermined decay time*" not being disclosed in document E1, the most straightforward understanding would be that it is a stored numerical value. For this reason, also the feature that the reference intensity-versus-time function is normalized prior to comparison (cf. feature E) is not disclosed in document E1.

Hence, features D and E are not disclosed in document E1.

Claims 8 and 15

With regard to claims 8 and 15, the appellant argued in writing that E1 (cf. Figure 5) disclosed a detector 36 and a microprocessor 44 for measuring, forming, comparing and normalizing the probe and the reference values and referred to the argumentation with regard to claim 1.

The respondent basically also referred, in writing, to the arguments with regard to claim 1 and specified that the microprocessor in E1 would only determine and compare decay times.

At the oral proceedings before the Board, both the appellant and the respondent did not have any further comments.

In analogy to the discussion with regard to claim 1, the Board concludes that features H and I of claim 8, and correspondingly feature J of claim 15 are not

disclosed in document E1, since a reference intensity-versus-time function is not disclosed.

Conclusion

Hence, the subject-matter of claims 1, 8 and 15 of the respondent's main request is novel with regard to document E1.

2.2.2 Document E6

Claim 1

Feature A

There was no dispute about the appellant's observation that feature A was disclosed in document E6.

Feature B

In the appealed decision (cf. Reasons, section 3.5.1), claim 1 was considered novel as compared to document E6, because feature B was allegedly not disclosed in E6. The opposition division held that *"Although document E6 partly provides only a very rough description of its claimed method, it is clearly described in claim 2 that the duration of the luminescence impulse at different intensity thresholds is measured - which is, as already mentioned above for document E1, the opposite of measuring intensity values at certain points in time."*

The appellant argued that it would be necessary for implementing the method of claim 2 of E6 that the intensity was measured continuously in time intervals, because otherwise it could not be determined whether a

particular registration threshold ("*Registrierungsschwelle*") had been reached or not. By using the registration threshold and the measured time an intensity-versus-time emission function was obtained and, thus, measured. Hence, feature B was disclosed in E6.

The respondent mentioned that E6 did not provide any detailed explanation, how the shape of the decay curve was determined. The only hint could be taken from claim 2, in which it was specified that the shape was determined by comparing decay times. Hence, the technical content of documents E1 and E6 was considered similar, since it was not disclosed that intensity values were measured at time intervals, but that decay times were measured.

As it is expressed already in section 2.2.1 above with regard to novelty of claim 1 of the respondent's main request over E1, the Board considers the wording of feature B so broad that it covers also methods which measure both time and intensity. As in E1, it also has to be checked in E6, whether the intensity values cross a threshold, which implies measuring the intensity.

Hence, feature B is disclosed in document E6.

Feature C

With regard to feature C, the appellant argued that claim 1 of E6 disclosed that the form or shape ("*Form*" in the German translation) of the luminescence pulse is measured. This was also disclosed on page 2, lines 17 and page 3, 1st paragraph. The luminescence pulse was considered as an intensity-versus-time emission function. Hence, feature C was disclosed in E6.

The respondent argued that document E6 did not provide any details about the way how the shape of the pulse was determined. The only hint was given in claim 2, specifying that the shape of the luminescence pulse was determined using the time of pulse (cf. "... die Form des Lumineszenzimpulses anhand der Dauer des Impulses am Ausgang des fotoelektrischen Detektors bei unterschiedlichen Registrierungsschwellen bestimmt wird."). Hence, there was no disclosure that a pulse in the form of an intensity-versus-time function was indeed determined in E6.

The Board agrees with the appellant that the wording of claim 1 of E6 ("*Form des amplitudennormierten Lumineszenzimpulses*") implies that a function - in the sense of a plurality of intensity-time value pairs - is determined, since otherwise no "*Form*" would be available. The example specified in claim 2 is interpreted by the Board as a particular possibility to determine such a "*Form*" (or at least a parameter thereof) in a convenient way for comparison purposes. Claim 1 of E6 however, has to be considered in a broader way. According to the Board's understanding, a skilled person would understand from the term "*Form des amplitudennormierten Lumineszenzimpulses*" a more or less continuous intensity-versus-time function.

Hence, feature C is disclosed in document E6.

Features D and E

With regard to feature E, the appellant argued that the adaptation of the amplification of the amplifier in E6 in response to the intensity of reflected light corresponded to the normalization of the intensity-

versus-time emission function as claimed in claim 1. The normalization was not precisely defined in feature E, so that the amplification performed in E6 effectively had the same effect of increasing or decreasing the complete function. This was also performed prior to the comparison, which was the only condition with respect to the order of steps expressed in feature E. Furthermore, claim 1 explicitly stated "*Form des amplitudennormierten Lumineszenzimpulses*".

On page 3, 1st paragraph it was disclosed that the measured impulse form was compared with the impulse form stored in the permanent memory. The stored impulse form corresponded to the reference intensity-versus-time emission function. Hence, feature D was then disclosed as well.

The respondent referred to claim 2 of E6 and stated that no other possibility of determining the shape of the impulse was disclosed than that of measuring times between thresholds. Hence, E6 could not disclose feature D, since only values were compared but not functions. With regard to feature E, the respondent emphasized that E6 did not disclose a normalization in the sense that the measured values were weighted to result in values between 0 and 1 (cf. a Wikipedia-article cited in the appellant's letter dated 22 April 2015), but rather concerned an amplitude standardization by adapting a gain of an amplifier in reference to a measured reflection of the illumination. Moreover, the gain change was effected before measuring the luminescence, i.e. before forming the function and not thereafter. Furthermore, E6 (cf. page 3, lines 12 to 14) mentioned that the relation of the amplitude of the reflected light pulse and the amplitude of the luminescence pulse was a code of the object, which

spoke against using the reflected light pulse for a normalization. In addition, document E6 did not mention that the function stored in the permanent memory was normalized.

The Board holds that feature D is disclosed in E6 (cf. page 3, lines 3 to 6) which clearly states that "*Das Identifizieren des Objekts wird erreicht durch einen Vergleich der gemessenen Impulsform mit der Form des Impulses, der sich im Permanentspeicher befindet*". As already discussed above with regard to feature C, the Board agrees with the appellant that the term "*Form*", as used in E6, is broader than the determination of decay times, as expressed in claim 2 of E6. A person skilled in the art would understand the term "*Form des Impulses, der sich im Permanentspeicher befindet*" as meaning an - at least nearly - continuous intensity-versus-time emission function. With regard to feature E, the Board agrees with the appellant that the term used in claim 1 "*Form des amplitudennormierten Lumineszenzimpulses*" discloses a normalization (cf. "...normiert") of the probe function. Since the normalization is not further specified in claim 1, the Board does not see any reason, why the terms of E6 ("*amplitudennormiert*") and of claim 1 ("*normalized*") should be interpreted differently. Since claim 1 of E6 does not provide a clear correlation of the "*gain adaptation*" described in the other claimed features and the use of the term "*amplitudennormiert*", the Board cannot agree to the respondent's statement that "*amplitudennormiert*" would only mean "*gain adapted*". However, document E6 is totally silent about a normalization of the function that is stored in the permanent memory.

Hence, at least the part of feature E that the reference intensity-versus-time emission function is normalized prior to comparison is not disclosed in E6.

Claims 8 and 15

With regard to claims 8 and 15, the appellant argued that E6 disclosed a detector ("*Detektor 4*") and a microprocessor ("*Formanalysator des Lumineszenzimpulses 5*") for measuring, forming, comparing and normalizing the probe and the reference values and referred to the argumentation with regard to claim 1.

The respondent basically also referred to the arguments with regard to claim 1.

In analogy to the discussion with regard to claim 1, the Board concludes that feature I of claim 8, and correspondingly feature J of claim 15 are not disclosed in document E6, since no normalization of the reference intensity-versus-time function is disclosed.

Conclusion

Hence, the subject-matter of claims 1, 8 and 15 of the respondent's main request is novel with regard to document E6.

2.3 Inventive Step (Article 56 EPC 1973)

2.3.1 The appellant raised an objection of lack of inventive step on the basis of the following documents:

E6 as closest prior art in combination with common general knowledge as expressed by E7 (Lakowicz, J.R.,

Principles of Fluorescence Spectroscopy, 2nd edition, Kluwer Academic Plenum Publishers, New York 1999), or

E6 in combination with E8 (EP-A-0 072 237), or

E1 as closest prior art in combination with E8, or

E2 (GB-A-2 095 822) as closest prior art in combination with E8.

Whereas all documents were discussed in the notice of opposition and the combination of E2 and E8 was discussed in the statement setting out the grounds of appeal, the other three combinations were discussed for the first time during oral proceedings before the Board.

In the oral proceedings, the respondent requested that the inventive step attacks based on the newly introduced combinations should be considered to be inadmissible, since according to Article 12(2) RPBA the statement of grounds of appeal should provide a complete case. Since the Board already provided comments with regard to E1 and E6 in the communication under Article 15(1) RPBA, the appellant should have provided corresponding inventive step arguments earlier. According to Article 13(1) RPBA a change of a case should only be allowed for good reasons.

The appellant argued that the introduction of the three new attacks should be allowed, since it was not foreseeable, how E6 would be understood by the Board. Only from the outcome of the discussion on novelty during oral proceedings before the Board, it became clear to the appellant that E6 might be a promising closest prior art document, since only feature E was

considered by the Board to be missing from its disclosure.

The Board admitted the three new attacks into the proceedings, since all documents mentioned above were known to the parties since the beginning of the opposition. Further, since the documents cited with the notice of opposition had already been discussed at length, no surprise from evaluating these documents should be expected.

2.3.2 E6 in combination with common general knowledge (as expressed by E7)

Considering document E6 as closest prior art, the appellant discussed the technical effect of the distinguishing feature, i.e. the normalization of the reference function. According to the appellant, the technical effect would result in a better comparison of two functions. This effect, however, was already discussed, for instance, in the Wikipedia-article on "*Normalisierung (Mathematik)*", where it is stated that "*Normalisierung kann dazu dienen, Ergebnisse mit unterschiedlicher Grundlage vergleichbar zu machen.*" Hence, a person skilled in the art knew that normalization solved the objective technical problem, starting from document E6, of better comparing two functions. The appellant also referred to document E7, a textbook that should be considered as evidence for common general knowledge. In particular, on page 117 (cf. Figure 4.26), page 121 (cf. Figure 4.30), page 96 (cf. Fig.4.1), page 111 (cf. Fig. 4.18) and page 135 (cf. Fig. 4.45) normalized decay curves were shown. Hence, normalization was well-known to a person skilled in the art in the field of decay curves. Further, document E6 already hinted to the "*Form*" of the curves,

which was considered to be important for comparison purposes. In the present case, the skilled person then knew that normalization was essential for comparing the probe function and the reference function. From E7 (cf. Figure 4.45) it was also apparent that a normalized function was useful for comparing non-exponential decays, since this Figure showed an increase of intensity followed by a decay. Moreover, this Figure showed decays for different materials, which could be compared due to normalization.

The respondent stated that feature E did not only rely on a normalization, as it was also mentioned that the normalization took place prior to comparison. According to the specification of the patent in suit (cf. e.g. paragraphs [0015] and [0017] of the B9 publication), the comparison of normalized functions allowed the use also for decay curves which showed no simple exponential decay behaviour and, moreover, could also overcome problems resulting from effects of ageing and dirtiness. Hence, the technical effect of the distinguishing feature was to render luminescence analysis more reliable. The respondent also emphasized that in E6 a clear indication was given not to normalize before comparing the functions, considering that claim 2 recited the feature that the shape of the pulse was determined by the duration of the pulse. Since document E6 did not discuss model-independent curve shapes, normalization would not give any advantage, when starting from E6. It was further mentioned in E6 (cf. page 3, lines 12 to 15) that "*Das Verhältnis der Amplitude des reflektierten Lichtimpulses und der Amplitude des Lumineszenzimpulses ist auch ein Code des Objekts*". This additional code would be lost, when the probe intensity-versus-time emission function would be normalized in the same way

as the reference intensity-versus-time emission function.

With reference to E7 (cf. Fig. 4.45), the respondent pointed out that this Figure did not relate to an authentication process. It was not disclosed that normalization could be used to make an authentication method more reliable. Document E7 only showed how different materials operate.

The Board agrees with the technical effect of the distinguishing feature (compared to E6) as formulated by the respondent, i.e. that a more reliable authentication is achieved, providing the possibility of dealing with non-exponential decay curves and with ageing and dirtiness. Hence, the technical problem can be formulated as providing a more reliable authentication method for luminescence probes.

The Board considers that the normalization used in the examples provided in document E7 is intended for illustration purposes in order to observe different decay behaviours of various materials. There is, however, in E7 neither a hint at that different decay behaviours could be used for authentication purposes nor that a normalization would make an authentication method more reliable. Hence, it might have been known to a person skilled in the art that normalization of decay curves is possible and that normalized decay curves could be used to illustrate decay behaviour of different luminescence materials, but the Board does not see any motivation in E7 to use normalized decay curves in order to make an authentication method more reliable. Even the above-cited passage from the Wikipedia-article does not change this view. A mere statement that results with different bases can be compared by normalization does not necessarily imply

that an authenticating method can be made more reliable. Thus, the Board can not see from this Wikipedia-article a motivation for a person skilled in the art to apply normalization to the method disclosed in document E6.

2.3.3 E6 in combination with E8

The appellant argued that, starting from E6 as closest prior art, the distinguishing feature as identified by the Board in the oral proceedings (i.e. the reference intensity-versus-time emission function is normalized prior to comparison) would result in the technical effect that curve shapes could be better compared. In searching for a solution, the person skilled in the art would arrive at document E8, since document E8 dealt with reflected light by the surface of banknotes. In view of the different security features to be investigated, the technical field of E6 was not different from that of E8. In the method as disclosed in document E8, a waveform should be compared to other waveforms. In particular, E8 disclosed a normalization of a measured waveform with regard to length and intensity (cf. page 12, line 25; page 13, line 15, page 13, lines 4 to 5). The person skilled in the art would learn that it was preferable to compensate for any overall differences in level. According to page 13, lines 8 to 11, a normalization was carried out depending on a mean value, which resulted in a "*fair comparison*" by differential squarer 17 (page 13, lines 13 to 15). Document E8 therefore incited the skilled person to make a normalization in order to compare functions, for instance the measured impulse form and the reference impulse form according to E6. Thereby, the normalization did not necessarily have to result in values between 0 and 1.

The respondent argued that the combination of E6 and E8 relied on hindsight. E8 neither dealt with luminescence nor with the aim of making more reliable a method for authenticating a probe marking. Hence, the technical fields of E6 and E8 were different. Further, document E8 did not teach a normalization as in feature E, since the same mean value was used, which would not result necessarily in values between 0 and 1 (as described in the Wikipedia article for "*Normalisierung*").

As already expressed above, the Board holds that the technical problem, when starting from document E6 as closest prior art, consists in providing a more reliable authenticating method for luminescence probes. Document E8 does neither deal with luminescence nor with authentication. The method disclosed in E8 is used for sorting banknotes, but not for authenticating them. Hence, the person skilled in the art would not combine document E8 with E6.

2.3.4 E1 in combination with E8

The appellant held that document E1 dealt with exponential and non-exponential decay curves (cf. page 9, lines 14 to 18, page 6, lines 23 to 24). Starting from E1 and considering the distinguishing features D and E, as identified by the Board in the oral proceedings, the appellant formulated the technical problem in providing a comparison of different curve shapes. From document E8 the skilled person would learn that for comparing data from arbitrary time functions a normalization should first be made. The appellant also stated that the fact that E8 did not mention luminescence was irrelevant.

The respondent stated that starting from document E1 the technical problem would consist in providing a more reliable authentication method for luminescence probes. A skilled person would, however, not consider document E8, since it did not deal with luminescence at all.

Also starting from document E1 as closest prior art, the Board sees the technical problem to be formulated as providing a more reliable authenticating method for luminescence probes. As already discussed above, document E8 deals neither with luminescence nor with authentication. The method disclosed in E8 is used for sorting banknotes, but not for authenticating them. Hence, the person skilled in the art would not combine document E8 with E1.

2.3.5 E2 in combination with E8

When discussing inventive step in section 3.7 of the appealed decision, the opposition division started from either document E1 or E2 and defined the technical problem as submitted by the opponent, i.e. finding a method to compare the shape of an intensity emission function which also worked if said function were not an exponential curve. The opposition division concluded that a person skilled in the art would not take into account document E8, since in E8 a waveform, which was characteristic of the surface of a banknote, was created by successive summed intensity signals. Although the waveform was a function of time, the time was not a decay time as in documents E1 and E2 but merely a parametrisation of the length of the scanned sheet. However, in order to solve the stated technical problem the skilled person would try to find documents which were related to luminescent decay.

The appellant held that the distinguishing features D and E referred to separate technical problems, i.e. comparison of functions by taking into account non-exponential decays and normalization by taking into account dirt and ageing. The appellant defined the person skilled in the art as an engineer or physicist working on evaluation of measurement results, in particular with regard to measurements with electromagnetic radiation, in particular luminescence, for authenticating/verifying documents. From document E2 the skilled person learned to use the time-dependent intensity of the decay curve, in order to perform an authentication. Document E8 also dealt with time-dependent intensity signals from the surface of a documents, also considering the effects of ageing and dirt. Hence, the skilled person would consider it. The time scale and wavelengths were the same in documents E2 and E8. Further, it had to be considered that the person skilled in the art would also check neighbouring technical areas. In this respect, documents E2 and E8 dealt with comparable problems. Further, the comparison of the shape of time-dependent functions was considered as a generally known method on which E8 relied for authentication of banknotes.

The respondent argued that features D and E were not shown in document E2 and, hence, formulated the technical problem as mentioned above when considering document E1 as closest prior art, i.e. providing a more reliable authentication method for luminescence probes. A skilled person would not turn to document E8, since it did not deal with luminescence at all.

Also starting from document E2 as closest prior art, the Board sees the technical problem to be formulated as providing a more reliable authenticating method for

luminescence probes, as defined by the respondent. As already discussed above, document E8 neither deals with luminescence nor with authentication. The method disclosed in E8 is used for sorting banknotes, but not for authenticating them. Hence, the person skilled in the art would not combine document E8 with E2.

Conclusion

Claim 1 is based on an inventive step. The same applies for claim 8, which includes the same features formulated in device-form, and for claim 15, which in feature J is back-referenced to claim 8.

- 2.4 The respondent's main request, therefore, is allowable.
3. Since the respondent's main request is allowable, there is no need to consider the first and second auxiliary requests.

4. Appellant's request for reimbursement of appeal fee

According to Rule 103(1)(a) EPC, the appeal fee shall be reimbursed, where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation. Since in the present case the appeal is not allowable, the request is void and, therefore, the appeal fee cannot be reimbursed.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar:

The Chairman:



R. Schumacher

G. Assi

Decision electronically authenticated