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Datasheet for the decision of 1 March 2019

Case Number: T 0067/16 - 3.4.03

Application Number: 03768359.6

Publication Number: 1576549

IPC: G07D7/12

Language of the proceedings: EN

Title of invention:
OPTICAL SENSING DEVICE FOR DETECTING OPTICAL FEATURES OF VALUABLE PAPERS

Patent Proprietor:
JAPAN CASH MACHINE CO., LTD.

Opponent:
Crane Payment Innovations, Inc.

Headword:

Relevant legal provisions:
EPC 1973 Art. 54(2), 56, 87(1)
EPC Art. 52(1), 54(3), 101(3)(a)
RPBA Art. 15(1)

Keyword:
Novelty - (yes)
Priority - same invention (no)
Inventive step - (yes)

Decisions cited:
T 1019/99, T 0144/10

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

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Case Number: T 0067/16 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 1 March 2019

Appellant: (Opponent)	Crane Payment Innovations, Inc. 3222 Phoenixville Pike, Suite 200 Malvern, PA 19355 (US)
Representative:	Peterreins Schley Patent- und Rechtsanwälte Hermann-Sack-Strasse 3 80331 München (DE)
Respondent: (Patent Proprietor)	JAPAN CASH MACHINE CO., LTD. 3-15, Nishiwaki 2-chome, Hirano-ku Osaka-shi, Osaka 547-0035 (JP)
Representative:	Flach Bauer Stahl Patentanwälte Partnerschaft mbB Adlzreiterstraße 11 83022 Rosenheim (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 29 October 2015 concerning maintenance of the European Patent No. 1576549 in amended form.**

Composition of the Board:

Chairman	G. Eliasson
Members:	S. Ward
	W. Van der Eijk

Summary of Facts and Submissions

I. This is the second appeal relating to European patent No. 1 576 549. In the decision leading to the first appeal, the Opposition Division revoked the patent on the grounds that the main request did not meet the requirements of Article 123(2) EPC and the first auxiliary request did not meet the requirements of Article 123(3) EPC; auxiliary requests 2 and 3 were not admitted into the proceedings.

The proprietor filed an appeal, and in decision T 144/10 the main request (submitted during oral proceedings before the Board) was found to meet the requirements of Articles 123(2) and 123(3) EPC. The case was remitted to the department of first instance for further prosecution.

The Opposition Division issued an interlocutory decision pursuant to Article 101(3)(a) EPC that, account being taken of the amendments made by the proprietor during the opposition proceedings to the main request, the patent and the invention to which it related met the requirements of the EPC.

The present appeal was filed by the opponent against the interlocutory decision of the Opposition Division.

II. At the end of the oral proceedings held before the Board in the present appeal, the appellant-opponent (hereinafter, the opponent) confirmed its request that the patent be revoked. The respondent-proprietor (hereinafter, the proprietor) confirmed its requests that the appeal be dismissed (hence, that the patent be maintained according to the version approved by the

Opposition Division), or failing that, that the patent be maintained according to one of auxiliary requests 1-4 (filed with letter of 25 January 2019).

III. The following documents are referred to in this decision:

E1: EP 1 321 904 A1
E3: GB 1 470 737
E5: EP 1 357 522 A2
E6: US 5 923 413
E7: US 6 486 464 B1
E8: WO 01/37226 A1
E9: GB 2 355 522 A
E10: JP 3037946 U
E10a: Partial English translation of E10.

IV. Claim 1 of the main request (including the feature numbering used in the statement of grounds of appeal) reads as follows:

"1. An optical sensing device for detecting optical features of valuable papers, comprising
2. first and second photocouplers (5, 9, 6, 10) positioned in the vicinity of and on the opposite sides of a passageway (13) for guiding the transported valuable paper (64);
3. said first photocoupler (5, 9) comprising a first light emitting element (20, 30) for emitting a first light of a first wavelength, and a first light receiving element (21, 31) adjacent to said first light emitting element (20, 30);
4. said second photocoupler (6, 10) comprising a second light emitting element (22, 32) for emitting a second light of a second wavelength different from the first wavelength, and a second light receiving element (23,

33) adjacent to said second light emitting element (22, 32);
5. the first light receiving element (21, 31) selectively receiving the first light reflected on the valuable paper (64) from the first light emitting element (20, 30) and the second light that penetrates the valuable paper (64) from the second light emitting element (22, 32); and
6. the second light receiving element (23, 33) selectively receiving the second light reflected on the valuable paper (64) from the second light emitting element (22, 32) and the first light that penetrates the valuable paper (64) from the first light emitting element (20, 30);
said device being characterized in that:
7. the first light emitting element (20, 30) is apposed to the first light receiving element (21, 31) transversely to the transported direction of the valuable paper (64) and in alignment with the second light receiving element (23, 33) across the passageway (13);
8. the second light emitting element (22, 32) is apposed to the second light receiving element (23, 33) transversely to the transported direction of the valuable paper (64) in alignment with the first light receiving element (21, 31) across the passageway (13);
9. one of the first and second lights is an infrared ray,
10. wherein the infrared ray penetrating the valuable paper (64) is received by the receiving element for providing reference or basic light data for detecting a light amount level of light other than infrared ray,
11. and the other of the first and second lights has a wavelength other than wavelength of infrared ray."

V. A communication under Article 15(1) RPBA was sent with the summons to oral proceedings, in which the Board expressed *inter alia* the provisional view that the phrase "in alignment with ... across passageway 13", in features 7 and 8, defined a geometrical arrangement in which the light emitting and receiving elements directly faced each other across the passageway, so that a line joining the centres of the two elements would be perpendicular to the passageway, as depicted in Figs. 5 and 6.

VI. The opponent's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

(i) In features 7 and 8 of claim 1, a light emitting element being "in alignment with" a light receiving element "across the passageway" meant merely that the light receiving element could receive light from the light emitting element, and did not imply that the elements were lined up in a perpendicular direction to the passageway.

(ii) Document E1 was prior art at least under Article 54(3) EPC, and anticipated all features of claim 1. In particular, feature 10 was anticipated by the calibration arrangements described in paragraphs [0030]-[0033].

(iii) The claimed priority of the main request was not valid. The alignment of the optical elements was not in the claims of the priority document, but only in a concrete form in the description and drawings in combination with other features which were not in claim 1 of the main request. In addition, the term "selectively", which appeared in claim 1 of the main request, did not appear either in the claims or the

description of the (translation of the) priority document. According to claim 7 of the priority document, the "first and second light emitting elements are turned on at the different points in time from each other", but this was not an adequate basis for "selectively receiving", which represented a broader concept. As a result of the invalid priority, documents E1 and E5 were prior art within the meaning of Article 54(2) EPC.

(iv) Document E10, even if not filed with the notice of opposition, should be admitted into the procedure. The Board's provisional understanding of "in alignment with ... across passageway 13" was a new interpretation, and the line of attack based on E10 was a response to this. In any event, E10 had been filed in the proceedings before the department of first instance and was well known to the proprietor.

(v) Claim 1 of the main request lacked inventive step starting from E10. E10 did not disclose the use of multiple wavelengths and time sequencing, but this was common knowledge in the art, as exemplified in documents E1, E3, E6 and E8. Feature 10 was also not disclosed in E10, but this aspect was known from documents E5, E6 or E9. The two differences did not have a synergistic relationship with each other.

(vi) Claim 1 of the main request lacked inventive step starting from E8. Even if E8 was considered to have a different geometrical arrangement to that claimed, such an arrangement was known from E10 and would be chosen by the skilled person as being compact and maximising the transmitted infrared radiation for use as reference data. Feature 10 was also not disclosed in E8, but this was not inventive for the reasons already explained in

the attack starting from E10. Again, there was no synergy between the two differences.

(vii) The inventive step attacks set out in the statement of grounds of appeal (based on E7 in combination with common general knowledge or with E5, E6 or E9; E1 in combination with E5; E6 in combination with E7, E1 or E8; and E9 in combination with E7, E1 or E8) were also maintained.

VII. The proprietor's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

(i) A light emitting element being "in alignment with" a light receiving element "across the passageway" meant that the receiving and corresponding emitting elements "directly face each other along a line perpendicular to the passageway". In addition, this meant that the two elements were optically coaxial.

(ii) In the light of this interpretation, E1 did not disclose the claimed type of alignment, and at least for this reason did not anticipate the combination of features of claim 1. In addition, the calibration arrangements described in E1 did not correspond to feature 10 of claim 1.

(iii) The priority of claim 1 of the main request was valid. The alignment feature could be derived from claim 5 of the priority document and was common to all described examples. The term "selectively" simply meant that the light emitting elements were turned on at different points in time from each other, which could be clearly derived from paragraph [0031].

(iv) Document E10 was late filed and should not be admitted into the procedure.

(v) Concerning inventive step, E10 did not disclose the use of multiple wavelengths and selectivity (time sequencing). Even if these features were known *per se* in the prior art, the invention resided in the combination with other features of the claim, namely the perpendicular geometric arrangement and the use of penetrating infrared radiation to provide reference data. The documents cited by the opponent as disclosing feature 10 in fact described other types of calibration arrangements, which did not anticipate the claimed feature.

(vi) Document E8 had an entirely different geometrical arrangement to that claimed, and the skilled person would have no reason to combine it with E10, as suggested by the opponent. Feature 10 was not disclosed in E8 or in the other available prior art.

(vii) The other inventive step attacks also failed to demonstrate that the skilled person would be led to the claimed invention in an obvious manner.

Reasons for the Decision

1. The appeal is admissible.

2. *Claim 1 of the Main Request: Interpretation*

2.1 Claim 1 of the main request comprises the following features:

"the first light emitting element (20, 30) is apposed to the first light receiving element (21, 31) transversely to the transported direction of the valuable paper (64) and in alignment with the second light receiving element (23, 33) across the passageway (13)" (feature 7); and

"the second light emitting element (22, 32) is apposed to the second light receiving element (23, 33) transversely to the transported direction of the valuable paper (64) in alignment with the first light receiving element (21, 31) across the passageway (13)" (feature 8).

2.2 These features make no reference to light beams emitted or received by the elements, or to optical alignment, optical axes or an optically coaxial arrangement. Rather, they set out the positional (not the optical) relationships between the elements themselves. The first light emitting element (20) is *apposed to* a first light receiving element (21) (i.e. the two elements are in juxtaposition, or side by side) in a direction transverse to the transported direction of bill. The first light emitting element (20) is *in alignment with* second light receiving element (23) *across passageway* (13), the most plausible reading of which is simply that they face each other directly across the passageway, in other words, they are positioned along a line perpendicular to the passageway. This is, moreover, the sense in which this terminology is consistently used in the description with reference to the drawings, and there is nothing to indicate any other intended meaning.

2.3 The opponent's argument that "alignment" in features 7 and 8 defines merely that the light receiving elements are arranged to receive light from the corresponding light emitting elements is not persuasive, as features 7 and 8 are not seen as defining optical pathways, but positional or geometric relationships.

If the opponent's interpretation of "alignment" were accepted, the corresponding subject-matter would be merely a repetition of aspects defined earlier in the claim. For example, feature 6 defines that the second light receiving element selectively receives the (penetrating) light from the first light emitting element. Feature 7 defines that the first light emitting element and the second light receiving element are in alignment across the passageway. If "alignment" merely means that the elements are arranged so that one may receive light from the other, then feature 7 adds nothing beyond what has already been defined in feature 6.

The Board sees no justification for interpreting features as mere repetitions of subject-matter already defined in the claim where, as in the present case, another more straightforward and plausible interpretation is available.

2.4 The Board's interpretation of features 7 and 8 is therefore that they specify an arrangement in which corresponding light emitting and receiving elements face each other along a line perpendicular to the passageway, as depicted in, for example, Figs. 5 and 6.

3. *Main request: Novelty of claim 1 in the light of E1*

3.1 Whether E1 is prior art according to Article 54(2) EPC is disputed (see section 4, below), but the proprietor does not dispute that E1 is prior art according to Article 54(3) EPC, and hence relevant for the question of novelty.

3.2 All embodiments of E1 show light from the emitting elements (e.g. 4, 4' in Fig. 1) passing through the banknote to the receiving elements (e.g. 6, 7, 6', 7' in Fig. 1) along paths which are *tilted* with respect to the plane P1 of the banknote, so that light from the emitting elements which is reflected from the banknote back to the receiving elements "will be diffusely reflected light", and any specularly reflected light will travel away from the receivers (paragraph [0014]). Perpendicular arrangements as defined in features 7 and 8 of claim 1 (according to the understanding of the Board set out above) are not disclosed. Moreover, the light emitting elements (4, 4') are aligned *with each other*, rather than with respective light receiving elements, as in the claimed arrangement. E1 does not therefore disclose claimed features 7 and 8.

3.3 Furthermore, in the claimed device it is the infrared ray penetrating the valuable paper which provides reference or basic light data (feature 10). In E1, the calibration step is carried out using reference members (60, 62) which are rotated into place and have predetermined reflection and transmission characteristics (paragraphs [0026], [0030]), or alternatively, reference members in the form of plastic sheets may be used (paragraph [0032]). Calibration by reference to the infrared ray penetrating the valuable paper itself, as in feature 10, is not disclosed.

3.4 Document E1 does not therefore anticipate the subject-matter of claim 1 of the main request.

4. *Priority of claim 1 of the main request*

4.1 The term "selectively", which appears in claim 1 of the main request, does not appear in either the claims or the description of the (translation of the) priority application. The closest corresponding feature in the priority application is that the "first and second light emitting elements are turned on at the different points in time from each other" (claim 7 and paragraph [0031]).

The Board can accept that "selectively receiving" light from first and second light emitting elements implies some form of temporal switching: the light is received from the first light emitting element or from the second light emitting element, but not from both at the same time.

It would, however, be immediately apparent to a skilled reader that providing selective reception of light at a detector could be achieved by means other than turning the first and second light emitting elements on and off at different points in time, for example, by providing switchable or movable spectral or polarisation filters in the optical path.

4.2 The term "selectively receiving" therefore goes beyond the disclosure of the priority document in this respect, and hence the inventions defined in claim 1 of the main request and in the priority document do not represent "the same invention" within the meaning of Article 87(1) EPC 1973. For this reason alone the claims of the main request do not enjoy the claimed

right of priority, and the other arguments relied upon by the opponent in this respect do not need to be considered. The consequence for the present procedure is that documents E1 and E5 are prior art within the meaning of Article 54(2) EPC 1973.

5. *Document E10 to be admitted into the procedure?*

5.1 Document E10 was not cited in the notice of opposition, but was filed subsequently during the proceedings before the department of first instance. Although the Opposition Division acknowledged its filing (Facts and submissions, point 2), it did not decide either to admit or not to admit it. The proprietor argues that E10 is late-filed and should not be admitted into the proceedings.

5.2 The proprietor confirmed at oral proceedings that its interpretation of features 7 and 8 was that the receiver and the corresponding emitter directly face each other along a line perpendicular to the passageway. However, in the written procedure (before both instances), it was not always so clear that this was what was being argued, as some statements of the proprietor appeared to lay significant stress on the notion that the light emitting and receiving elements were optically coaxial (which, by itself, would not necessarily imply a perpendicular arrangement). While the proprietor's present position is not an entirely new development, it can be seen to represent a clarification, in the light of which (and taking into account the Board's provisional opinion on this matter) it is reasonable to allow the opponent to re-consider its inventive step attacks.

5.3 Moreover, document E10 is well-known to the proprietor from the first instance proceedings (and from the parallel proceedings based on divisional applications derived from the application on which the present patent is based).

5.4 E10 is therefore admitted into the procedure.

6. *Inventive step starting from E10*

6.1 Claim 1 of the main request is distinguished from the device of E10 by the following features:

- "selectively receiving" (from features 5 and 6);

- "one of the first and second lights is an infrared ray ... and the other of the first and second lights has a wavelength other than wavelength of infrared ray" (features 9 and 11); and

- "the infrared ray penetrating the valuable paper (64) is received by the receiving element for providing reference or basic light data for detecting a light amount level of light other than infrared ray" (feature 10).

6.2 In the written procedure, the opponent argued that the first of these features ("selectively receiving") was disclosed in E10, since "the the light sources 2, 3 can be activated separately" which would imply selective reception. The Board's view is that "selectively receiving" means that, in operation, the device is arranged to function such that the first light receiving element receives either the first reflected light or the second penetrating light, but not both at

the same time (and similarly for the second light receiving element). This is not disclosed in E10.

6.3 The first two features may be grouped together, and the associated problem can be seen as that proposed in paragraph [0001] of the patent: "to improve validation performance of the valuable paper".

6.4 Document E10 discloses a "bill validation sensor", which implicitly would be employed in an optical sensing device as defined in feature 1 of claim 1. E10 (or at least that part of it for which a translation has been provided by the opponent) appears to be almost exclusively concerned with the responses of the sensor 13 depicted in Fig. 3(A) to the test object shown in Fig. 3(D) (a sheet of white paper having a narrow black line on one surface 31, and being blank on the opposite surface 30) under the following conditions:

(a) light sources 2 and 3 activated, with surface 30 on the side of sensor 13 (Fig. 4(E));
(b) light sources 2 and 3 activated, with surface 31 on the side of sensor 13 (Fig. 4(F));
(c) only source 3 activated (Fig. 4(G));
(d) only source 3 activated, cylindrical lenses 8, 10 omitted (Fig. 4(H)).

6.5 E10 is entirely silent on how the sensor arrangement would actually be operated in a bill validation device. Even if it is considered implicit (from Figs. 4(E) and 4(F)) that the sensor may be operated in both transmission and reflection, there is no indication whether one or more wavelengths should be used, which wavelength(s) to use, or whether light is to be received from emitting elements simultaneously (as it

would be in the tests from which Figs. 4(E) and 4(F) are derived) or selectively (e.g. sequentially).

6.6 The skilled person looking to put the bill validation sensor of E10 to practical use in a bill validator device would, however, be aware that such devices routinely employ multiple wavelengths (possibly including infrared) turned on and off in a time sequential manner, as reflected, for example, in the following cited prior art:

- E1, which discloses a banknote validator using multiple wavelength LEDs such as red, green, blue and infra-red (paragraph [0025]) in a time-sequential manner (paragraph [0028]).

- E3, which discloses an apparatus for optically testing the authenticity of bank notes using sources of red, yellow or green and "light in the invisible range" (page 4, lines 48-56) operated cyclically (e.g. claim 5).

- E6, which discloses a device for identifying the denomination and authenticity of banknotes using emitters including red, green, blue and infrared which are selectively operable (column 3, lines 4-12; column 5, lines 56-67; column 6, lines 27-44). This "enables the gathering of much more data concerning the note image and material properties than prior types of note denominators and validaters" (column 7, lines 23-30), hence implicitly improving discrimination.

- E8, which discloses a banknote verification apparatus successively exposing a note to several light sources with different spectral properties

(abstract) including infra red (page 15, lines 21-26; page 17, line 22 - page 18, line 12).

6.7 Even where the reason for employing multiple wavelengths sequentially is not explicitly stated in the prior art documents, it would be clear to the skilled person that the purpose is to increase the amount and variety of data collected, to thereby improve validation performance of the device. It would therefore be obvious for the skilled person to incorporate the first two distinguishing features listed above under point 6.1 into the device of E10.

6.8 The technical effect of the third distinguishing feature listed under point 6.1 (feature 10) is explained in paragraph [0023] of the patent as follows:

"When infrared ray penetrates bill 64, it can be received by a light receiving element with less impact by colored ink printed on bill 64 but with impact by paper quality of bill 64, and therefore, received infrared ray can provide reference or basic light data for detecting a light amount level of light other than infrared ray, such as red, green, yellow, blue or ultraviolet light. In this case, difference between received light amounts of infrared ray and light other than infrared ray provides good optical data without influence by paper quality of bill 64."

6.9 The Board endorses the view taken in T 1019/99 that:

"the correct procedure for formulating the problem is to choose a problem based on the technical effect of exactly those features distinguishing the claim from the prior art that is as specific as possible without

containing elements or pointers to the solution" (T 1019/99, point 3.3 of the Reasons).

6.10 In the present case, the general purpose of the claimed invention is to detect optical features, in particular "optical patterns for different colors printed on valuable paper" (paragraph [0009]), and the specific problem solved by feature 10 is to ensure that the detection of optical features of valuable papers is not influenced by the paper quality of the bill. The Board sees this as a reasonable objective technical problem, given that a validation device would be expected to accurately detect optical features of, for example, brand new banknotes as well as banknotes which are soiled, worn or otherwise displaying signs of deterioration in paper quality.

In arguing that the claimed solution to this problem is obvious, the opponent invoked documents E5, E6 and E9.

6.11 Although the mention of "quality" in the title of E5 ("Paper quality discriminating machine") may create the initial impression that it is concerned with the problem set out above, the word "quality" appears only once in the description (in paragraph [0001]) as follows:

"The present invention relates to a machine and a method for identifying paper quality, to be more precise, paper material."

In other words, the device of E5 is concerned with identifying *types* of paper, as may be seen from Figs. 3-9, which show the capacity of the device to distinguish six common paper types by illuminating samples with both short and long wavelength light under

various conditions. A particular aim is to determine whether a banknote is made from genuine banknote paper. E5 is not concerned with the objective technical problem mentioned above, or with the identification of optical features at all.

6.12 It is true that E5 discusses variations in the paper material caused by e.g. deterioration and wear (paragraph [0047]), and suggests that the long wavelength light should be chosen in the range 420-1000 nm, as the absorbance of light in this range is less influenced by such variations.

However, this paragraph concerns reducing the effect of variations in absorption due to differing paper quality in a method of identifying paper type according to absorption of incident light. There is no *a priori* reason to suppose that the measures proposed would represent a solution to the problem solved by feature 10 of claim 1, namely reducing the influence of variations in paper quality on the detection of optical features.

Moreover, there is no specific teaching in E5 to use infrared light. The main part of the proposed range (420-1000 nm) falls in the visible spectrum (about 350-750 nm), the remainder (750-1000 nm) being a small part of the infrared. In addition, all concrete examples use reflective arrangements, a transmission arrangement being mentioned only briefly (paragraph [0041]), and not in combination with variations in the paper material or infrared light. The Board therefore sees no reason to conclude that a skilled person would be led in an obvious manner to feature 10 on the basis of the combination of E10 and E5.

6.13 Document E6 discloses an apparatus for indicating a note type having spot sensing assemblies including selectively operable blue, green, red and infrared LEDs, and photocells for detecting transmitted and reflected radiation. The type of banknote is determined by evaluating the degree of correlation between a set of sensed values and a set of stored reference values by means of a formula given at line 20 in column 8. For each set of sensed data (representative of the reflectance or transmission values from the note) the correlation is calculated using *inter alia* the average value (μ_x) and the standard deviation (σ_x) of the sensed data (x_i). The opponent argues that the parameters μ_x and σ_x correspond to the claimed "reference or basic light data", and that some embodiments calculate the correlation using the average and standard deviation obtained from *all* of the measured data, including the transmitted infrared light, as reference data for *each* of the measured values, including those of the non-infrared radiation. Feature 10 is thereby disclosed.

6.14 The Board does not agree. In the optical sensing device of claim 1 of the main request, infrared and non-infrared radiation are detected in both transmission and reflection, and:

"the infrared ray penetrating the valuable paper (64) is received by the receiving element for providing reference or basic light data for detecting a light amount level of light other than infrared ray".

A skilled person reading the claim would derive that, in operation, the transmitted infrared ray plays a particular role in the device, namely to provide a calibration level, by reference to which the level of

non-infrared light is evaluated. A feature formulated in this way cannot credibly be understood to mean (or to include the possibility) that the transmitted infrared ray plays no special role in this regard, and that in fact all rays (transmitted and reflected, infrared and non-infrared) are used, on an equal footing, to provide reference or basic light data, as the opponent argues is the case in E6.

6.15 In the Board's view the only reasonable understanding of feature 10 is that, for each cycle of data acquisition, the level of non-infrared radiation is evaluated by reference to the detected level of the transmitted infrared radiation, for example as a difference or ratio. Hence, even if the skilled person were motivated to incorporate the correlation calculation of E6 into the device of E10 (which is questionable), this would not lead to the claimed device.

6.16 Document E9 discloses a banknote validator in which light from blue (or ultraviolet) and infrared sources is detected in both transmission and reflection. According to the various possibilities set out on page 17 (points 1-4) for combining the measured data, the transmitted infrared radiation may be used as a reference level for the transmitted blue radiation.

6.17 However, E9 is concerned with verifying the authenticity of a banknote or the like by determining the authenticity of the paper substrate. In particular, the device enables banknote paper to be distinguished from photocopier paper (which "most counterfeiters use" for their forgeries) on the basis of their respective short wavelength spectral responses.

E9 is therefore not concerned with the problem solved by feature 10, namely ensuring that the detection of optical features is not influenced by variations in the paper quality, and in fact is not concerned with detecting optical features at all. As a result, E9 is no more relevant than E5 (in fact less so, as, unlike E5, E9 makes no mention of the problem of deterioration of paper quality). The skilled person would not therefore be led in an obvious manner to feature 10 on the basis of the combination of E10 and E9.

7. *Inventive step starting from E8*

7.1 It was common ground that claim 1 of the main request differed from E8 firstly in the perpendicular geometry referred to above under point 2.4, and secondly as a result of feature 10.

7.2 The opponent argues that the first difference would be obvious in the light of document E10. Fig. 3 of E8 discloses a rather complex arrangement of ten emitters (1A - 1'E) on the left-hand side and five detectors (2A - 2'D) on the right-hand side. Starting from E8, the Board finds it implausible that a skilled person would abandon this arrangement entirely and replace it with one based on Fig. 3 of document E10. It is also not seen why such a modification would lead to a more compact arrangement, as suggested by the opponent, assuming the number of emitters and detectors remained the same.

7.3 It is not, however, necessary to pursue this point, as the arguments advanced by the opponent on the other difference (feature 10) are the same as those used in the attack starting from E10, and have already been found by the Board not to be persuasive. The subject-

matter of claim 1 of the main request is therefore not obvious starting from E8.

8. *Inventive step: other attacks*

8.1 In the light of the Board's stated understanding of the positional relationship between the claimed light emitting and receiving elements (see point 2.4, above), the opponent only pursued inventive step attacks starting from E10 and E8 at oral proceedings. The other attacks set out in the statement of grounds of appeal were not, however, abandoned.

8.2 Nevertheless, since the opponent has not persuaded the Board that any of the available prior art renders feature 10 obvious, these attacks must also fail.

9. *Conclusion*

9.1 The Board therefore concludes that the subject-matter of claim 1 of the main request involves an inventive step within the meaning of Article 52(1) EPC and Article 56 EPC 1973.

9.2 No objections have been raised against dependent claims 2 and 3 of the main request, or against the description or drawings, and the Board sees no reason to raise any. The patent may therefore be maintained according to the version approved by the Opposition Division.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated