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Datasheet for the decision of 1 March 2019

Case Number: T 1109/16 - 3.4.03

Application Number: 06024350.8

Publication Number: 1752933

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. 56, 76(1), 87(1)
EPC Art. 52(1), 123(2)
RPBA Art. 15(1)

Keyword:
Amendments - added subject-matter (no)
Priority - basis in priority document (yes)
Inventive step - (yes)

Decisions cited:
T 1019/99

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 1109/16 - 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 4 March 2016 concerning maintenance of the European Patent No. 1752933 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 an appeal by the opponent against the interlocutory decision of the Opposition Division that, account being taken of the amendments made by the proprietor during the opposition proceedings according to the proprietor's then first auxiliary request, European patent No. 1 752 933 and the invention to which it related met the requirements of the EPC.

II. The patent is based on European application EP 06 024 350, which is divided from parent application EP 03 768 359, originally filed as international application JP2003/017006 and published as WO 2004/061784 A1.

In the notice of opposition, the patent was opposed on the grounds that the subject-matter extended beyond the content of the earlier application as filed (Articles 100(c) and 76(1) EPC) and that the subject-matter was not new (Articles 100(a), 52(1), 54 EPC) and did not involve an inventive step (Articles 100(a), 52(1), 56 EPC).

III. At the end of the oral proceedings held before the Board, the appellant-opponent (hereinafter, the opponent) confirmed its request that the decision under appeal be set aside and the patent revoked.

The respondent-proprietor (hereinafter, the proprietor) confirmed its request that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the following documents:

- Claims: 1 and 2 of the main request, as filed on 28 January 2019;

- Description: pages 2-7, as filed on 1 March 2019 during oral proceedings before the Board;
- Drawings: Sheets 1/9-9/9 as in the published patent specification.

Failing that, the proprietor requested that the patent be maintained in amended form on the basis of one of auxiliary requests 1-7, all filed with letter of 28 January 2019.

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

D2: JP 3037946 U
D2a: Partial English translation of D2.
D3: WO 01/37226 A1
D4: EP 1 321 904 A1
D6: GB 1 470 737
D7: EP 1 357 522 A2
D8: US 5 923 413
D10: GB 2 355 522 A

V. Claim 1 of the main request reads as follows:

"An optical sensing device for detecting optical features of valuable papers, comprising first and second triplex assemblies (7, 8, 11, 12, 72-79) positioned on the opposite sides of a passageway (13) for guiding the transported valuable paper (64); one of the first and second triplex assemblies having first and second light emitting elements (24, 34, 42, 48, 53, 58) for emitting first and second lights, and a first light receiving element (25, 35, 43, 49, 54, 59) adjacent to the first and second light emitting elements;

the other of the first and second triplex assemblies having a third light emitting element (26, 36, 40, 46, 50, 56) for emitting a third light, and second and third light receiving elements (27, 37, 41, 47, 51, 57) adjacent to the third light emitting element;
wherein
the first and second triplex assemblies are positioned in the vicinity of and on the opposite sides of the passageway (13) and in vertically spaced relation to each other across the passageway (13);
the first light receiving element is positioned between the first and second light emitting elements;
the third light emitting element is positioned between the second and third light receiving elements;
the first and second light emitting elements are located in alignment with respectively the second and third light receiving elements;
the third light emitting element is located in alignment with the first light receiving element;
the first light receiving element receives the first and second lights reflected on the valuable paper (64), and the third light penetrating the valuable paper (64);
the second light receiving element receives the first light penetrating the valuable paper (64) and the third light reflected on the valuable paper (64);
the third light receiving element receives the second light penetrating the valuable paper (64) and the third light reflected on the valuable paper (64);
characterized in that
the third light has a wavelength different from those of the first and second lights;
the first, second and third light emitting elements are turned on at different points in time;
at least one of the light emitting elements produces infrared ray; and

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

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

(i) Claim 1 of the main request extended beyond the content of the parent application as originally filed, contrary to Article 76(1) EPC. The claimed features that the first light receiving element "is positioned between the first and second light emitting elements" and the third light emitting element "is positioned between the second and third light receiving elements" were only disclosed in specific embodiments of the parent application in combination with other (non-claimed) features. In particular, the feature that the "emitting and receiving elements in each triplex assembly are arranged in a line perpendicular to the direction for moving bill 64" was absent from claim 1. The described inner and outer light emitting and receiving elements in the triplex arrangements were also absent from claim 1. A corresponding objection arose under Article 123(2) EPC in relation to the application as filed.

(ii) It followed, by virtue of the similarity of the priority application to the parent application, that the claimed subject-matter did not have a basis in the priority application, and hence the priority claim was invalid. All cited references (including D4 and D7) were therefore prior art under Article 54(2) EPC.

(iii) Claim 1 of the main request lacked inventive step starting from D2. D2 did not disclose the use of

multiple wavelengths, including infrared, and turning the light emitting elements on at different points in time, but this was common knowledge in the art, as exemplified in documents D3, D4, D6, D8 and D10. D2 also did not disclose that the infrared ray penetrating the valuable paper provided reference or basic light data for the level of the non-infrared light, but this aspect was known from documents D7, D8 and D10. The two differences did not have a synergistic relationship with each other.

(iv) Claim 1 of the main request lacked inventive step starting from D3. Even if D3 had a different geometrical arrangement to that claimed, such an arrangement was known from D2 and would be chosen by the skilled person as being compact and maximising the transmitted infrared radiation for use as reference data. Using the penetrating infrared ray to provide reference or basic light data was also not disclosed in D3, but this was not inventive for the reasons already explained in the attack starting from D2. Again, there was no synergy between the two differences. A similar argument could be made starting from document D4.

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

(i) The main request complied with the requirements of both Article 76(1) and 123(2) EPC. It was implicit in claim 1 that the three elements in the triplex assemblies were arranged in a line, as disclosed in the parent application and the original application as filed. It was not essential that this line be perpendicular to the transport direction. The arrangements of Fig. 11 were not part of the invention,

as had been made clear by the amendments to the description.

(ii) By similar reasoning the priority of claim 1 of the main request was valid.

(iii) A first difference of the claimed subject-matter over D2 was the use of multiple wavelengths (including infrared) switched on at different times. Even if this concept was known *per se* in the prior art, the invention resided in the combination of this feature with other features of the claim. A second difference was the use of penetrating infrared radiation to provide reference data. The documents cited by the opponent in this respect described types of calibration arrangements which did not anticipate the claimed feature.

(iv) Document D3 had an entirely different geometrical arrangement to that claimed, and the skilled person would have no reason to combine it with D2, as suggested by the opponent. The use of penetrating infrared radiation to provide reference data was not disclosed in the available prior art.

Reasons for the Decision

1. The appeal is admissible.

2. *Article 76(1) EPC 1973*

2.1 Claim 1 of the main request is chiefly based on claims 14-19 of the parent application as originally filed, in

combination with features taken from the description and drawings. These features are, according to the opponent, "described as inextricably linked" with other features which have not been imported into the claim, thereby introducing subject-matter which was not originally disclosed in the parent application.

In particular, on page 17 (second paragraph, first two lines) it is stated that the light emitting and receiving elements in each triplex assembly "are arranged in a line perpendicular to the direction for moving bill 64", as depicted in Figs 3-7, 9 and 10. The opponent argues that the absence of this feature from claim 1 is contrary to the requirements of Article 76(1) EPC.

2.2 This feature may be considered to comprise two aspects: firstly, the elements of the triplex assemblies are arranged in a line, and secondly, the line is perpendicular to the direction of transport of the bill.

In relation to the first aspect, claim 1 of the main request defines that the first light receiving element "is positioned between the first and second light emitting elements" and that the third light emitting element "is positioned between the second and third light receiving elements". This formulation would not appear to make sense for triplex assemblies in which the elements were not arranged in a line, for example the triangular arrangements of Fig. 11 (which have been acknowledged in the amended description not to form part of the invention). It is therefore implicit that the elements of the claimed triplex assemblies are arranged in a line, and so this first aspect is not seen as having been omitted from the claim.

2.3 It remains to be decided whether omitting the second aspect constitutes an extension of subject-matter beyond the parent application as originally filed.

In judging the question of added subject-matter in cases such as the present one, the criterion mentioned by the opponent (features being "inextricably linked") is routinely seen as decisive:

"Extracting an isolated feature from an originally disclosed combination and using it for delimiting claimed subject-matter can only be allowable under the concept of Article 123(2) EPC if that feature is not inextricably linked with further features of that combination." (T 714/00, Reasons, point 3.3; see also *Case Law of the Boards of Appeal of the European Patent Office, 8th edition 2016, II.E.1.7*).

This principle will be applied here.

2.4 In the embodiments referred to above, linear triplex assemblies are described and depicted as extending in a line perpendicular to the transport direction of the bill, but it is nowhere disclosed that such a perpendicular orientation is essential, or even preferred. A device with linear triplex assemblies set at an angle other than 90° to the transport direction of the bill would no doubt give rise to operational differences compared to a perpendicular arrangement, which might be regarded as advantageous or disadvantageous, depending on circumstances, but the Board sees no reason why a functioning optical sensing device could not be based on non-perpendicular orientations. The perpendicular aspect is not therefore seen as being inextricably linked either to the linear

aspect or to the other features in the disclosed embodiments.

2.5 The opponent's objection that the claim fails to include the described feature that the triplex assemblies have inner and outer elements merely reflects a difference of terminology. Each triplex assembly has an element positioned between two other elements. These two other elements are the outer elements, and the element between them is the inner element.

2.6 No objection has been raised against claim 2 in this regard, and the Board therefore concludes that the main request meets the requirements of Article 76(1) EPC 1973.

3. *Article 123(2) EPC*

Claims 1-8 of the application as originally filed include subject-matter essentially corresponding to that of claims 14-19 of the parent application. The descriptions are also essentially the same. The main request therefore meets the requirements of Article 123(2) EPC for the reasons set out above in relation to the requirements of Article 76(1) EPC 1973.

4. *Priority*

4.1 The opponent argues that the description and drawings of the parent application "are contained almost identically in the priority application", and since the subject-matter of claim 1 is not disclosed in the parent application, it follows that the priority claim of claim 1 of the main request is invalid.

4.2 For the reasons set out above under point 2, however, the Board concludes that the subject-matter of claim 1 is disclosed in the parent application as originally filed, and hence this argument must fail.

The inventions defined in claim 1 of the main request and in the priority document are considered to represent "the same invention" within the meaning of Article 87(1) EPC 1973, and since no other reason is apparent to the Board why the claimed priority should be called into question, the priority claim of the main request is judged to be valid. As a consequence, documents D4 and D7 are prior art only within the meaning of Article 54(3) EPC, and therefore not relevant for assessing inventive step.

5. *Inventive step starting from D2*

5.1 In the written procedure, the opponent argued that D2 disclosed the feature that "the first, second and third light emitting elements are turned on at different points in time", as this was understood to mean merely that these elements *can* be turned on at different points in time. In a communication under Article 15(1) RPBA, the Board gave its provisional opinion that this feature is to be interpreted as meaning that, in operation, the claimed optical sensing device functions such that the first, second and third light emitting elements are arranged to be turned on at different points in time. The matter was not pursued further at oral proceedings, and the Board sees no reason to deviate from its provisional opinion in this regard.

5.2 Consequently, the features distinguishing claim 1 of the main request from the device of D2 may be grouped as follows:

(a) "the third light has a wavelength different from those of the first and second lights", "at least one of the light emitting elements produces infrared ray" and "the first, second and third light emitting elements are turned on at different points in time"; and

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

5.3 The problem solved by feature (a) can be seen as that proposed in paragraph [0001] of the patent: "to improve validation performance of the valuable paper".

5.4 Document D2 discloses a "bill validation sensor", which implicitly would be employed in an optical sensing device as defined in claim 1 of the main request. D2 (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:

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

5.5 D2 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 sequentially.

5.6 The skilled person looking to put the bill validation sensor of D2 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:

- D3, 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).

- D6, 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).

- D8, 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).

5.7 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 feature (a) into the device of D2.

5.8 The technical effect of distinguishing feature (b) is explained in paragraph [0030] 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."

5.9 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).

5.10 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 [0007]of the patent), and the specific problem solved by feature (b) 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 D7, D8 and D10. As explained above, D7 has been found to be prior art only within the meaning of Article 54(3) EPC, and hence not relevant in judging inventive step.

5.11 Document D8 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 (b) is thereby disclosed.

5.12 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 D8.

5.13 In the Board's view the only reasonable understanding of feature (b) 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 D8 into the device of D2 (which is questionable), this would not lead to the claimed device.

5.14 Document D10 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.

5.15 However, D10 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.

D10 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. The skilled person would not therefore be led in an obvious manner to feature (b) on the basis of the combination of D2 and D10.

6. *Inventive step starting from D3*

6.1 It was common ground that claim 1 of the main request differed from D3 firstly in defining a different geometrical arrangement of the emitters and detectors, and secondly as a result of feature (b).

6.2 The opponent argues that the first difference would be obvious in the light of document D2. Fig. 3 of D3 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 D3, 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 D2. 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.

6.3 It is not, however, necessary to pursue this point, as the arguments advanced by the opponent on the other difference (feature (b)) are the same as those used in the attack starting from D2, and have already been found by the Board not to be persuasive (see points 5.8 - 5.14, above). The subject-matter of claim 1 of the main request is therefore not obvious starting from D3.

7. *Conclusion*

7.1 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. No objections have been raised against dependent claim 2, and the description has been suitably adapted.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain European patent No. 1 752 933 in amended form on the basis of the following documents:

   Claims: 1 and 2 of the main request, as filed on 28 January 2019;

   Description: pages 2-7, as filed on 1 March 2019 during oral proceedings before the Board;

   Drawings: Sheets 1/9-9/9 as in the published patent specification.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated