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**Datasheet for the decision
of 7 April 2016**

Case Number: T 2632/11 - 3.4.03

Application Number: 06119249.8

Publication Number: 1760669

IPC: G07D5/00

Language of the proceedings: EN

Title of invention:

Coin detecting apparatus

Applicant:

Laurel Precision Machines Co., Ltd.

Headword:

Relevant legal provisions:

EPC 1973 Art. 56

Keyword:

Inventive step - after amendment (yes)

Decisions cited:

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T 2632/11 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 7 April 2016

Appellant: Laurel Precision Machines Co., Ltd.
(Applicant) 12-5, Nishi-Shinsaibashi 1-chome,
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Osaka-shi,
Osaka (JP)

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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 8 July 2011
refusing European patent application No.
06119249.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman G. Eliasson
Members: T. M. Häusser
C. Heath

Summary of Facts and Submissions

- I. The appeal concerns the decision of the examining division refusing the European patent application No. 06 119 249 for lack of inventive step (Article 56 EPC 1973) in relation to the main request pending at the time. Furthermore, the examining division exercised its discretion as provided for in Rule 137(3) EPC and did not consent to the amendments to the claims of the auxiliary requests pending at the time.
- II. The appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:
- claims 1 and 2, as submitted with the letter dated 22 January 2016;
 - description: pages 1 and 8 to 20 as originally filed; pages 2, 2a, 2b, and 3 as submitted with the letter dated 22 October 2009; pages 4 to 7 and 21 as submitted with the letter dated 22 January 2016;
 - drawing sheet 1/1 as originally filed.

The appellant's request for reimbursement of the appeal fee was withdrawn with the letter dated 22 January 2016.

- III. Reference is made to the following documents:

D1: US 5 576 825 A,
D2: US 6 688 449 B,
D3: JP H9-97363 A.

- IV. The wording of independent claim 1 is as follows (board's labelling "a)" to "i)"): :

"1. A coin detecting apparatus (1) comprising:

- a) - a light source (2) for emitting a light beam onto either of two surfaces of a coin (2);
- b) - a half mirror (3) for splitting the light beam reflected on the surface of the coin into a transmitted light beam and a reflected light beam;
- c) - a first image-capturing section (5) for obtaining a full image of the surface of the coin in accordance with one of the transmitted light beam and the reflected light beam;
- d) - a second image-capturing section (6) for obtaining an image of a central portion of the coin in accordance with the other one of the transmitted light beam and the reflected light beam, said second image-capturing section having a higher resolution than that of the first image-capturing section; and
- e) - an image-processing section (9) which is provided with a storage section for storing full images corresponding to both sides of each coin and partial images having high resolution corresponding to central portions of each coin, a full image comparison section for comparing the full image of one of two surfaces of the coin input from the first image-capturing section (5) with the full images previously stored in the storage section by rotating the full images previously stored, and a partial image comparison section for comparing the partial image of the central portion of one of two surfaces of the coin input from the second image-capturing section (6) with the partial images previously stored in the storage section by rotating the partial images previously stored, wherein
- f) - the image-processing section (9) determines whether comparison results of the full image comparison section and of the partial image comparison

section correlate, and confirms a type of coin if the comparison results correlate with the full image comparison section and the partial image comparison section,

- g) - a lens (8) is disposed between the half mirror and the second image-capturing section (6)
- h) - comparison processed by the full image comparison section and comparison processed by the partial image comparison section is carried out in parallel, and
- i) - the resolution of the partial images and image area of the partial images are predetermined so that at least patterns of the central portion of the coin are capable of being captured as an image; and the data size of the captured image is less than or equal to that of the full images."

V. The appellant argued essentially as follows in relation to inventive step:

Document D1 was considered the closest prior art, from which the claimed subject-matter differed in features b) and d) to i). The objective technical problem had to be drafted on the basis of the technical effect resulting from this combination of features, which was the problem recited in the description of the application on page 2, lines 19-22, namely to offer a coin detecting apparatus with improved detection accuracy and shortened time for handling the data.

In document D1 a dichroic mirror was used in order to achieve accurate detection, which was obtained thanks to the use of red and orange wavelengths. Since the dichroic mirror had to be used for this purpose and could not be replaced by a half mirror, the use of a half mirror was not obvious over the combination of

documents D1 and D2. Furthermore, there was no incitation in documents D1 or D2 to use a sensor having higher resolution than the other sensor (feature d)). It was not disclosed in these documents, either, that two comparisons were carried out in parallel (feature h)) and that the resolution of the partial images and image area of the partial images were predetermined so that at least patterns of the central portion of the coin were capable of being captured as an image, and that the data size of the captured image was less than or equal to that of the full images (feature i)). Therefore, the skilled person had no incitation to modify the apparatus of document D1 to achieve the invention.

Reasons for the Decision

1. Amendments

Claim 1 is based on claims 1 and 3 to 5 as originally filed and on the description as originally filed (page 10, lines 15-22; page 11, line 15 - page 12, line 18; page 14, line 21 - page 15, line 8; page 15, line 23 - page 16, line 17; page 16, line 22 - page 17, line 4; page 17, lines 14-18).

Dependent claim 2 is based on original claim 6. The description has been brought into conformity with the amended claims and supplemented with an indication of the relevant content of the prior art without extending beyond the content of the application as filed.

Accordingly, the board is satisfied that the amendments comply with the requirements of Article 123(2) EPC.

2. Inventive step

2.1 Closest state of the art

In the decision under appeal the examining division assessed inventive step starting from document D1 as the closest state of the art. The appellant also considered this document as the closest state of the art. Indeed, document D1 discloses subject-matter that is conceived for the same purpose as the claimed invention, namely for providing a coin detecting apparatus, and has the most relevant technical features in common with it, as detailed below. Document D1 is therefore regarded as the closest state of the art.

2.2 Distinguishing features

2.2.1 Document D1 generally relates to devices for detecting patterns formed, for example, on a bank note or coin. In relation to the embodiment of Figure 6 the document discloses (see column 7, lines 12-56, and Figure 6) that the printed pattern detecting apparatus comprises a light source 1 for emitting light having red and orange wavelengths, a lens 3, an optical fiber bundle 2, a fiber plate 5, sensors 4a and 4b, and a shielding plate 6. In addition, the apparatus comprises a beam splitter 8, a lens 9 arranged such that the focal points thereof are positioned on the surface of the sensor 4b and on the end face of the fiber plate 5, and a dichroic mirror 10 for reflecting light of a wavelength substantially corresponding to that of orange and for transmitting light of other wavelength. The dichroic mirror is arranged such that another focal point of the lens 9 is positioned on the surface of the sensor 4a.

The light having red and orange wavelengths emitted from the light source 1 enters the beam splitter 8 via the lens 3 and the optical fiber bundle 2 and passes through the fiber plate 5 so that the surface of the bill 7 is irradiated thereby. The light reflected from each of the micro areas on the surface of the bill 7 passes through a corresponding optical fiber 5a of the fiber plate 5 and is thereafter reflected by a 45 degree reflecting mirror of the beam splitter 8 towards the dichroic mirror 10. The reflected light of orange wavelength is converged onto the surface of the sensor 4a, whereas other reflected light is converged onto the surface of the sensor 4b. Consequently, by scanning the sensor 4a, a first printed pattern based on the reflected orange light from the bill 7 can be obtained, and by scanning the sensor 4b, a second printed pattern based on the reflected red light from the bill 7 can be obtained.

The printed patterns transferred onto the image formation surfaces of the sensors 4a, 4b are scanned in the scanning direction perpendicular to the conveying direction A of the bill 7 in response to clock signals from a control device so as to feed the thus obtained printed pattern data for the entire bill surface to the processing device, whereby they are compared with the reference pattern to discriminate the genuineness, kind and the like of the bill 7.

Using the embodiment of Figure 6 it is also possible to detect patterns formed on the surface of a coin (see column 9, lines 4-7).

- 2.2.2 Consequently, document D1 discloses, using the wording of claim 1, a coin detecting apparatus comprising:
- a light source (1) for emitting a light beam onto either of two surfaces of a coin;

- a half mirror (dichroic mirror 10) for splitting the light beam reflected on the surface of the coin into a transmitted light beam and a reflected light beam (the dichroic mirror 10 is splitting the beam of the light source 1 into a transmitted (red wavelengths) and reflected beam (orange wavelengths));
- a first image-capturing section (sensor 4a) for obtaining a full image of the surface of the coin in accordance with one of the transmitted light beam and the reflected light beam (namely the reflected light beam);
- a second image-capturing section (sensor 4b) for obtaining a full image of the coin in accordance with the other one of the transmitted light beam and the reflected light beam (namely the transmitted light beam), and
- an image-processing section which is provided with a storage section for storing full images corresponding to both sides of each coin, a full image comparison section for comparing the full image of one of two surfaces of the coin input from the first image-capturing section (sensor 4a) with the full images previously stored in the storage section (reference patterns).

2.2.3 The subject-matter of claim 1 differs from the apparatus of document D1 in that:

- d) ' - the second image-capturing section is for obtaining an image of a central portion of the coin and has a higher resolution than that of the first image-capturing section (part of feature d)); and
- e) ' - the storage section of the image-processing section is for storing also partial images having high resolution corresponding to central portions of each coin, the full image comparison section is

for comparing the full image of one of two surfaces of the coin input with the full images previously stored in the storage section by rotating the full images previously stored, the image-processing section further comprises a partial image comparison section for comparing the partial image of the central portion of one of two surfaces of the coin input from the second image-capturing section with the partial images previously stored in the storage section by rotating the partial images previously stored (part of feature e)), wherein

- f) - the image-processing section determines whether comparison results of the full image comparison section and of the partial image comparison section correlate, and confirms a type of coin if the comparison results correlate with the full image comparison section and the partial image comparison section,
- g) - a lens is disposed between the half mirror and the second image-capturing section,
- h) - comparison processed by the full image comparison section and comparison processed by the partial image comparison section is carried out in parallel, and
- i) - the resolution of the partial images and image area of the partial images are predetermined so that at least patterns of the central portion of the coin are capable of being captured as an image; and the data size of the captured image is less than or equal to that of the full images.

2.3 Objective technical problem

In the decision under appeal the examining division held that the distinguishing features of claim 1 of the main

request pending at the time over document D1 were independent of each other (point 16 of the Reasons). However, distinguishing features d)' and i) of present claim 1 over the closest prior art document D1 relate to the capturing of partial images corresponding to the central portions of each coin and to the resolution and data size of these partial images; moreover, distinguishing features e)', f), and h) relate to the comparison of the partial images with previously stored images and to the corresponding processing. All of these features are therefore *functionally interdependent* and it is not appropriate to formulate partial problems in relation to them. Rather, one single objective technical problem should be formulated in view of the technical effect of these features.

By providing a second determination of the coin type using partial images in addition to the first one using full images and by comparing the respective results the accuracy of the coin detection is improved, particularly since high resolution is used for the partial images. Furthermore, by limiting the data size of the partial images the processing time is reduced.

The objective technical problem is therefore to improve the accuracy of coin detection while allowing short processing time (see description of the application, page 2, lines 19-22).

2.4 Obviousness

In the apparatus of Figure 6 of document D1, two sensors are used in order to allow colour separation and to accurately detect the printed pattern by means of a simpler optical system (D1, column 7, lines 58-62). However, both sensors 4a and 4b capture images of the

entire object (D1, column 7, lines 49-57). Alternatively, light from a particular micro area on the surface of the object may be received (D1, column 9, lines 10-19). However, there is no indication in document D1 of providing the claimed determination of the coin type using a combination of full and partial images. Since the sensors 4a and 4b are intended for receiving light of different wavelengths from the same portion of the object under investigation, the skilled person would not be led to adapt the apparatus in such a way as to capture full and partial images of the object, either, let alone to use the claimed higher resolution for the partial image.

Document D3, which is cited in the description, corresponds essentially to the above embodiment of document D1. Document D2 also provides merely a single determination of the coin type using the images captured around concentric circles about the center of the token (D2, column 5, lines 29-65). The common general knowledge would not lead the skilled person to the claimed subject-matter, either.

The subject-matter of claim 1 is therefore considered to involve an inventive step. Claim 2 is dependent on claim 1. Accordingly, the subject-matter of claims 1 and 2 involves an inventive step (Article 52(1) EPC and Article 56 EPC 1973).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent in the following version:
 - claims 1 and 2, as submitted with the letter dated 22 January 2016;
 - description: pages 1 and 8 to 20 as originally filed; pages 2, 2a, 2b, and 3 as submitted with the letter dated 22 October 2009; pages 4 to 7 and 21 as submitted with the letter dated 22 January 2016;
 - drawing sheet 1/1 as originally filed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Eliasson

Decision electronically authenticated