

Internal distribution code:

- (A) [] Publication in OJ
- (B) [] To Chairmen and Members
- (C) [X] To Chairmen

D E C I S I O N
of 29 March 1995

Case Number: T 0960/92 - 3.4.2
Application Number: 87300251.3
Publication Number: 0230365
IPC: G01B 11/06, G01N 21/35, G06F 15/20
Language of the proceedings: EN

Title of invention:

Method and apparatus for sensing or determining one or more properties or the identity of a sample

Applicant:

Infrared Engineering Limited

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 82, 84, and 123(2) EPC

Keyword:

"Unity - (yes) after amendment"
"Claims - clarity (yes) after amendment"
"Amendments - added subject-matter (no)"
"Remittal to the Examining Division"

Decisions cited:

-

Catchword:

-



Case Number: T 0960/92 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 29 March 1995

Appellant: Infrared Engineering Limited
Blue Mill
Woodham Walter
Maldon
Essex CM9 6LS (GB)

Representative: Carpmael, John William Maurice
CARPMAELS & RANSFORD
43 Bloomsbury Square
London, WC1A 2RA (GB)

Decision under appeal: Decision of the Examining Division of the European
Patent Office dated 13 April 1992 refusing
European patent application No. 87 300 251.3
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: W. W. G. Hofmann
L. C. Mancini

Summary of Facts and Submissions

- I. The Appellant lodged an appeal against the decision of the Examining Division on the refusal of the application No 87 300 251.3 (publication number 0 230 365).

During the examination procedure, the Examining Division had cited the documents

- (D1) IBM Technical Disclosure Bulletin Vol. 24, No. 1A, June 1981, pages 49 to 54,
- (D2) US-A-4 555 767,
- (D3) Applied Optics, Vol. 24 (June 1985), pages 1693 - 1695,
- (D4) Applied Optics, Vol. 18 (1979), pages 3851 - 3856,

and, in its decision of refusal, had held that the subject-matter of the independent Claims 1 and 18 lacked novelty.

- II. In a communication, the Board raised objections regarding lack of clarity and questioned the unity of invention. Oral proceedings were held at the end of which the Appellant requested that the decision under appeal be set aside and the case be remitted to the Examining Division for further prosecution on the basis of amended Claims 1 to 29 filed at the oral proceedings.

- III. The wording of the independent Claims 1 and 17 on file at the time of the present decision reads as follows:

"1. A method of determining a property or identity of a sample in which electromagnetic radiation is subject to optical interference depending on said property or identity, the method comprising the steps of:

(a) causing a plurality of components of electromagnetic radiation in a spectral range to be transmitted through, or reflected from said sample, said components having different wavelengths, or mean wavelengths;

(b) measuring the transmittance or reflectance of said sample for each of said components subject to said interference in order to derive a set of respective measured values;

(c) correlating said set of measured values of transmittance or reflectance with each of a plurality of sets of different known values of transmittance or reflectance for said components subject to said interference, said sets of different known values representing either different magnitudes of said property for a known material, or the identities of different materials in a group of possible materials;

(d) selecting the set of known values having an optimum correlation with said set of measured values, the selected set of known values thereby enabling the magnitude of the property of the sample, or the identity of the material in the sample to be determined;

wherein at least three, and not more than twelve components are selected from said spectral range, the selection being made on the basis of said wavelengths, or mean wavelengths, and being such that if the selected components were transmitted through, or reflected from samples which have different magnitudes of the property, or which are made of different materials, said sets of measured values would be different for the different magnitudes or identities; the selection of said components also being such that the wavenumber or mean wavenumber spacing of said components is irregular."

"17. Apparatus for determining a property or identity of a sample in which electromagnetic radiation is subject to optical interference depending on said property or identity, the apparatus comprising:-

(a) means (1, 2) for causing a plurality of components of electromagnetic radiation in a spectral range to be transmitted through, or reflected from said sample (4), said components having different wavelengths, or mean wavelengths;

(b) means (5, 6, 7) for receiving said transmitted or reflected components subject to said interference and for deriving a set of corresponding measured values;

(c) means (8) for providing a plurality of sets of different known values of transmittance or reflectance for said components subject to said interference, said sets of different known values representing either different magnitudes of said property for a known material, or the identities of different materials in a group of possible materials; and

(d) means (8) for determining the correlation between said set of measured values and said sets of known values and for selecting the set of known values having an optimum correlation with said set of measured values, the selected set of known values thereby enabling the magnitude of the property of the sample, or the identity of the material in the sample to be determined;

wherein the means (1, 2) for causing said components of radiation to be transmitted through, or reflected from said sample (4) provides at least three and not more than twelve components from said spectral range, the selection being made on the basis of said wavelengths, or mean wavelengths, and being such that if the selected

components were transmitted through, or reflected from samples which have different magnitudes of the property, or which are made of different materials, said sets of measured values would be different for the different magnitudes or identities; the selection of said components also being such that the wavenumber or mean wavenumber spacing of said components is irregular;

and in that said means (c) and (d) are computing means (8) programmed with a mathematical model or models to which are applied (i) known values of the wavelengths or mean wavelengths and (ii) different magnitudes of the property, or the identity to be determined in order to derive sets of model values, said computing means (8) correlating said set of measured values with said sets of model values and selecting the set of model values with an optimum correlation."

Claims 2 to 16 and 18 to 29 are respectively dependent on Claims 1 and 17.

IV. The arguments presented by the Appellant were essentially as follows:

The independent claims are now restricted to the case that it is optical interference in the sample which is used for determining the unknown characteristics of the sample, and that the different components used for measurement are distinguished from each other by their wavelengths, or mean wavelengths (the latter for the case of different wavelength bands). The objection of lack of unity of invention is therefore met.

The claims indicate that the "known values" used for correlation are either values of a known sample material or values of a group of materials which is known to comprise the sample material. The claims are therefore clear.

Reasons for the Decision

1. The appeal is admissible.

2. The Board considered it necessary to first establish unity of invention in the sense of Article 82 EPC for the claims of the application before the examination as to the other requirements of the EPC can be continued. At the oral proceedings, upon objections of the Board, the Appellant filed an amended set of claims. The point at issue is not the relationship between the two independent Claims 1 and 17 since the features of the apparatus according to Claim 17 essentially correspond to the features of the method according to Claim 1. However, Claim 1 as well as Claim 17, even in the new wording, each comprise several alternatives which have to be investigated as to the presence of a single general inventive concept by which they are linked. It should be noted that - although Article 82 EPC requires a single general inventive concept - the Board does not intend to judge beforehand on novelty and inventive step of the subject-matter claimed in the newly filed claims since - for the reasons given below - it is of the opinion that examination of the new claims regarding these criteria should first be performed by the first instance. Since the examination procedure will anyway be continued, it is considered sufficient, for the time being, to check whether there is non-unity in the sense of a "non-unity a priori", or not.
 - 2.1 In Claim 1, the alternative "determining a property or identity of a sample" distinguishes between two cases which are not basically different. The identity (material) is also a property of a sample and, as can be seen from feature (c) of Claim 1, in both cases the

"determination" is actually a selection from a number of given possibilities, one of which, as must be presumed, is sufficiently representative of all the relevant aspects of the sample. For this reason, the alternatives "property" or "identity" and the corresponding alternatives "different magnitudes" or "different materials in a group of possible materials" and "magnitude of the property" or "identity of the material" do not destroy the unity of the claimed subject-matter.

Whether, according to the further alternatives of Claim 1, the components have different wavelengths or different mean wavelengths (any optical radiation has necessarily a certain bandwidth), and whether the measurement is made in transmittance or reflectance, corresponds - in the context of the claim - to pairs of equivalents.

The subject-matter defined in present Claim 1 therefore fulfils the requirement of unity (Article 82 EPC) in the sense mentioned above in paragraph 2.1. The same is true for Claim 17 which contains the same alternatives as Claim 1.

3. The original disclosure of present Claim 1 is mainly based on the original Claim 1, limited to the alternative that the sample is subject to optical interference and supplemented with the features from original Claims 2 and 9 (see also page 6, lines 25 to 30) that the components have different wavelengths or mean wavelengths and the wavenumber or mean wavenumber spacing is irregular. The condition that the "different materials" must belong to a group of "possible materials" can be derived from the original page 48, lines 27 to 31.

The upper limit of twelve selected components for the case - now exclusively maintained - of interference and different (mean) wavelengths of the components, is disclosed on page 23, lines 28 to 31. The statement that the selection of the components is such that "if the selected components were transmitted through ... , said sets of measured values would be different for the different magnitudes or identities" expresses nothing else than the evident fact that for the selected components (wavelengths) the "expected values of transmittance or reflectance" (cf. e.g. page 8, line 32; page 9, lines 22/23; page 10, line 5) within the different sets of values should not all be the same for the different magnitudes or identities (otherwise they would evidently be useless for the desired determination of the unknown property). This is implicit in the statement that the correlation coefficient should change sufficiently with the change of the "trial values", cf page 53, lines 17 to 21, and can also be seen from the variations of the curves in Figures 2, 3 and 6.

For these reasons, the present Claim 1 meets the requirements of Article 123(2) EPC.

The same is true for the apparatus Claim 17, the features of which essentially correspond to those of Claim 1. The additional features relating to the computing means which derive sets of model values and perform the correlation are disclosed in the original Claims 20 to 22.

4. *Clarity*

The present Claim 1 is now restricted to the case of measurement by means of optical interference and only contains those of the previous alternatives which are compatible with this measuring method (in particular,

the different components with which the measurement is made, are specified to be distinguished by their wavelengths, or mean wavelengths). It is expressed in a sufficiently clear way that by the correlation the selection is made between sets of known values. It is further taken into account that the sets of "known values" can only be known if the material of the sample is known, or if at least a group of "possible materials" (comprising the unknown material and consisting of materials having "known values") can be defined. The term "possible materials" expresses the fact that each of the individual materials of this group possibly corresponds to the material to be determined. This term (disclosed on original page 48, line 29) is considered acceptable in view of the fact that other terms might involve the danger of adding new subject-matter to the original disclosure.

The term "irregular" (wavenumber spacing) is not very specific. However, this is not so much considered as a question of clarity, but a question of wide scope which should be dealt with in connection with the judgment of novelty and inventive step.

Thus, present Claim 1 is clear in the sense of Article 84 EPC.

Apparatus Claim 17 essentially corresponds to method Claim 1. The additional part relating to the computing means again mentions different magnitudes of the property, or the identity to be determined, and corresponding sets of model values. It is considered to be clear from feature (c) of the claim that these magnitudes of the property refer to a property of a known material, and the identity refers to different materials in a group of possible materials.

Thus, Claim 17 is also sufficiently clear.

The dependent claims are respectively adapted to Claims 1 and 17.

5. The Board did not find it advisable at the present time to deal with the question of correct separation of the independent claims into two parts in accordance with Rule 29(1) EPC. This separation may cause some difficulties in particular due to the various alternatives still contained in Claims 1 and 17, and would, in any case, touch upon the examination of novelty. For this reason, the one-part form is presently considered adequate.
6. The new claims still have to be examined for novelty and inventive step of their subject-matter, and, as the case may be, the description will have to be adapted to the claims.

The previous independent claims have been quite substantially changed by the deletion of most of the great variety of alternatives contained therein and by the introduction of necessary clarifications, so that, in the view of the Board, the newly claimed subject-matter can no longer be compared to that on which the decision of the Examining Division was based. Moreover, the decision of the Examining Division was primarily based on the case of scattering which is no longer contained in Claims 1 and 17.

Therefore, in order to avoid loss of an instance for the Appellant, the Board considers it necessary to allow the Appellant's request and remit the case to the Examining Division for further prosecution (Article 111(1) EPC).

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 for further prosecution on the basis of the amended Claims 1 to 29 filed at the oral proceedings.

The Registrar:

The Chairman:

P. Martorana

E. Turrini