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D E C I S I O N
of 26 May 1994

Case Number: T 0603/92 - 3.4.1

Application Number: 88102751.0

Publication Number: 0313716

IPC: G01T 1/178

Language of the proceedings: EN

Title of invention:
Radiation dose measuring method and apparatus with nuclide discrimination function

Applicant:
Hamamatsu Photonics K.K.

Opponent:
-

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Presentation of case by assistant: allowed (VII; I)-"
"Inventive step (denied)"

Decisions cited:
T 0598/91 (headnote OJ EPO 1993,12)

Catchword:
Presentation of case by assistant allowed, following professional representative's oral statement that the applicant had given permission for this.

Case Number: T 0603/92 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 26 May 1994

Appellant: Hamamatsu Photonics K.K.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 6 February 1992 refusing European patent application No. 88 102 751.0 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: G. D. Paterson
Members: Y. J. F. van Henden
R. K. Shukla

Summary of Facts and Submissions

I. European patent application No. 88 102 751.0 (published under No. 0 313 716) was refused by decision of the Examining Division.

II. The refusal was based on a set of claims, received on 31 October 1991 and comprising two independent claims numbered 1 and 10. Claim 1 of this set is an apparatus claim reading

"A portable radiation measurement apparatus comprising:

first memory means for storing nuclear radiation decay energy spectra of a plurality of selected radionuclides;

a nuclear radiation calibration source;

detection means, responsive to independent absorptions of nuclear radiation, for generating electrical pulses corresponding to an electrical charge proportional to the energy of said nuclear radiation and the number of said pulses being proportional to the number of said independent radiation absorptions;

digitizing means, having a predetermined resolution, for digitizing the charge magnitude of said pulses;

second memory means for accumulating a charge magnitude distribution of the number of said independent radiation absorptions having similar digital values; and

a central processing unit (CPU) operative to convert said charge magnitude distribution into a nuclear radiation energy level distribution, and operative to compare said nuclear radiation energy level distribution to said stored nuclear radiation

decay energy spectra to identify the radionuclide emitting said nuclear radiation,
characterized in that
said nuclear radiation calibration source is the naturally-occurring radionuclide ^{40}K."

III. In its decision, the Examining Division cited document

D2: US-A-4 580 048

and explained that, with respect to the prior art which can be derived therefrom, the subject-matter of the above Claim 1 would be novel in that a ^{40}K calibration source is used in place of a ^{133}Ba source. The problem to be solved by the invention was thus that of avoiding difficulties related to the use of the latter source, and no inventive step is required to select ^{40}K as source material if the conditions of use are different.

In a previous communication, the Examining Division had furthermore pointed out that an artificial source of gamma radiation has to be used according to document (D2) because the radiation of said source and the radiations to be detected are measured at the same time. However, if the desired accuracy can be achieved when carrying out the correction procedure before the actual measurement, the skilled person understands that any arbitrary radiation source may be chosen, including a naturally occurring radionuclide.

IV. The Applicant lodged an appeal against the decision of the Examining Division.

With its Statement of Grounds of appeal, the Appellant filed a new set of claims, the only amendment to Claim 1 being that the calibration source was said to be "a potassium compound with the naturally-occurring isotope composition of potassium". Oral proceedings were requested in case the Board did not envisage granting a European patent on the basis of this new set of claims.

V. In a communication pursuant to Article 11(2) RPBA, the Board took the provisional view that Claim 1 had been amended in such a way that it contained subject-matter extending beyond the content of the application as filed. The Board furthermore completed the argumentation of the Examining Division and explained why, in its judgment, the new Claim 1 lacked an inventive step.

VI. The Appellant filed on 26 April 1994 comments on the communication of the Board, and a new set of Claims 1 to 17 to replace those submitted with the Statement of Grounds of appeal.

The first claim of this set is distinguished over the version refused by the Examining Division in that

(a) the mention of "a nuclear radiation calibration source" is replaced by that of "calibration means including a nuclear radiation calibration source" in the pre-characterising part, and

(b) its characterising part reads "characterized in that said calibration source is a potassium compound (12) with the naturally-

occurring isotope composition of potassium and has a recess for inserting the detector means (14) such that the detector means is substantially surrounded by the source material, and said calibration means are adapted to detect the radiation of the calibration source over a measuring period of several minutes."

Claim 10 of the set is directed to the radiation measurement method actually carried out when using an apparatus according to Claim 1.

VII. Oral proceedings were held on 26 May 1994.

At the beginning of the oral proceedings, the authorised representative of the Appellant, Mr Schumann, requested that the Appellant's case should be presented primarily by Mr Bernhardt, an assistant in the firm of European patent attorneys which represented the Appellant, who was not yet qualified. He stated that the Appellant had given his approval of the conduct of the oral proceedings in this manner.

The Board allowed this request. During the course of the oral proceedings submissions were made on behalf of the Appellant by both Mr Bernhardt and Mr Schumann.

VIII. During the hearing, the Board expressed the view that, when envisaging the use of a calibration source with a lower level of gamma radiations, it is obviously necessary to extend the measuring period to several minutes, as well as to increase the surface area of the scintillator of a radiation measurement apparatus intercepting the radiation emitted by the source so as

to increase the total amount of radiation received and hence to provide the latter with a recess for receiving therein the scintillator.

IX. The Appellant requested that the impugned decision be set aside and that a European patent be granted on the basis of the new Claims 1 to 17 filed on 26 April 1994. Its argumentation in support of these requests may be summarised as follows:

The disclosure in (D2) has to be considered as a whole and, as stated in the claims, is essentially directed to the use of artificial sources of gamma radiations. This document, therefore, does not hint at using a naturally occurring material to make a calibration source. Furthermore, the document does not disclose that there might be any problem related to such an artificial source.

In a first step, the inventor had thus to find out that a calibration source having a very low radioactivity has to be chosen in order to obviate the necessity of any radiation protection. The skilled technician admittedly knows that increasing the measuring period reduces the relative error in the use of such a source. Nevertheless, he would not expect that, with a source having a radioactivity below any limit set by the relevant regulations, calibration can be performed within an acceptable time interval.

In a second step, the inventor had to discover that, by choosing natural potassium as a source of low radioactivity and by substantially surrounding the detector with this material, several minutes are enough

to achieve a satisfactory calibration accuracy. This result could not be expected for it requires the combination of two factors, namely the insertion of the detector in a recess of the calibration source - whereby the number of incident photons is increased - and the fact that, owing to its higher gamma energy level, ^{40}K produces a narrower distribution of pulse charge magnitude than most of the radioactive isotopes to be measured.

The Appellant furthermore submitted that the use of a potassium compound including potassium with its naturally occurring isotope composition as calibration source was disclosed on page 5 of the published patent application, lines 5 to 26. Nevertheless, its Representative admitted that he was not aware of any published literature in the field which would have established technical prejudice against the use of a naturally occurring potassium compound.

X. After deliberation by the Board, the decision was announced that the appeal is dismissed.

Reasons for the Decision

1. *Representation*

Decision T 598/91 (to be published in OJ EPO: headnote published in OJ EPO 1993, 12) explains the current practice regarding pleading by assistants during oral proceedings, in particular if both the Board and the party for which the assistant speaks have given their permission for such a course. In the present case, following this decision, the Board gave its permission on the basis of Mr Schumann's statement that the Appellant company had given permission for Mr Bernhardt to present its case orally.

2. *Disclosure in document (D2)*

2.1 Document (D2) relates to a radiation measurement apparatus - see the title. This apparatus comprises:

- first memory means for storing nuclear radiation decay energy spectra of a plurality of selected radionuclides - see column 3, lines 1 to 7;

- calibration means including a nuclear radiation calibration source (16) - see column 2, lines 40 to 42;

- detection means responsive to independent absorptions of nuclear radiation, for generating electrical pulses - see column 2, lines 28 to 37;

- digitizing means for digitizing the charge magnitude of said pulses - see column 3, lines 34 to 37;

- second memory means for accumulating a charge magnitude distribution of the number of said independent radiation absorptions having similar digital values - see Figure 2 and column 2, lines 33 to 37 - and

- a central processing unit (17) operative to convert the charge magnitude distribution into a nuclear radiation energy level distribution, and operative to compare said nuclear radiation energy level distribution to said stored nuclear radiation decay energy spectra to identify the radionuclides emitting said nuclear radiation - see column 3, lines 1 to 7.

Furthermore, it is a matter of course that the digitizing means of this prior art apparatus have a "predetermined resolution". Likewise, it is also evident that the number of electrical pulses generated by the scintillator (12) and the pre-amplifier (13) of said apparatus is proportional to the number of gamma photons absorbed by the scintillator (12), and that said electrical pulses correspond to an electrical charge proportional to the energy of the nuclear radiation. Besides, there is no reason to suppose that the calibration means of this known apparatus would not be adapted to detect the radiation of the calibration source during several minutes. Nevertheless, no statement in document (D2) allows to assert that the radiation measurement apparatus described there is "portable".

2.2 In the Board's judgment, therefore, the subject-matter of Claim 1 is distinguished over the radiation measurement apparatus known from document (D2) in that:

(a) the radiation measurement apparatus is portable;

(b) the calibration source is a potassium compound with the natural isotopic composition of potassium, and in that

(c) said calibration source has a recess for inserting the detector means (14) such that the latter is substantially surrounded by the source material.

3. *Inventive step*

3.1 Because of irregularities of a ground formation to be explored, prospectors mostly need devices which are portable. Besides, it is stated in column 3 of document (D2), lines 21 to 24, that the preamplifier (13) of the apparatus is "battery powered", thus hinting at its portability. In the Board's judgment, therefore, the reference to a portable apparatus in Claim 1 is at the utmost an indication of size and not evidence of any inventive step.

3.2 In a system according to document (D2), the calibration source (16) is "positioned so as to permit measurement of the artificial gamma radiation by the detector **at the same time** as the measurement of the natural gamma radiation" - see column 1, lines 63 to 66. For this reason, essential requirements are that the radioactive material of this source be temperature insensitive and that it be not liable to interfere with the energy peaks from the measured elements - see column 1, lines 59 to 63. Nevertheless, document (D2) does not limit to ^{133}Ba the choice of said radioactive material for it goes on teaching that any suitable (gamma)

energy source that meets the above requirements may be used - see column 2, lines 59 to 62. With regard thereto, the Board shares the Examining Division's view that, if other elements than those mentioned in (D2) are to be detected, or if the calibration source is removed before the actual measurement is carried out, any radioactive element appropriate for making a calibration source may be chosen - cf. Section 6 of the decision under appeal. In the Board's opinion, as the absence of interfering factors is usually preferred while carrying out measurements, a skilled person would indeed contemplate the possibility of previously removing the calibration source.

At this stage, said skilled person just needs to consult physical tables, in particular those concerning the isotopic composition of the chemical elements and the radioactivity of their various isotopes, to select materials suitable as calibration sources. This, however, is routine work and no inventiveness is required to find out that about ten to fifteen grams of natural potassium would meet the necessary requirements. Likewise, to compensate for the comparatively weak gamma emission from natural potassium, no other possibility is left to the skilled person than performing the calibration over a period of several minutes and, in conjunction, arranging the source in relation to the scintillator so that the latter intercepts a relatively large number of gamma photons emitted by the source. The provision of a recess in the calibration source for inserting said scintillator therefore appears to be of obvious necessity.

3.3 To support the view that Claim 1 would involve an inventive step, the Appellant set forth that document (D2) would not hint at using natural potassium to make a calibration source.

As the Examining Division correctly observed, however, potassium is one of the elements to be measured by means of the apparatus described in (D2) and, besides, it is pointed out there that potassium is "an important source of gamma radiation" - see column 1, lines 19 to 21. Bearing this in mind, there is no reason to question the relevance of using natural potassium for making a calibration source. It is indeed beyond doubt that, if the content of potassium disseminated in a geological formation can be measured with an apparatus of the kind described in (D2), then several minutes will be enough to achieve a satisfactory calibration when disposing a few grams of a potassium compound adjacent to the scintillator of such an apparatus. At this stage, the possibility to dispense with a shielding appears to be an advantage resulting from the use of natural potassium rather than a requirement to be met. Furthermore, the Appellant's argument based on this possibility is the less convincing as Claim 3 of the set received on 26 April 1994 is directed to the provision of an enclosure made of a metal with high atomic weight for holding the calibration source and for shielding the scintillator from ambient nuclear radiation.

3.4 In the Board's judgment, therefore, Claim 1 as filed on 26 April 1994 lacks an inventive step. Independent Claim 10 relates to a radiation measurement method and is distinguished over the method of measuring radiation

described in (D2) by the use of features (b) and (c) in section 2.2 above. The subject-matter of Claim 10, therefore, also does not involve an inventive step for the reasons given in sections 3.1 to 3.3 above.

4. The independent Claims 1 and 10 of the set filed on 26 April 1994, therefore, are not allowable - Article 52(1) EPC in conjunction with Article 56 EPC.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Beer G.D. Paterson