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D E C I S I O N
of 24 June 2005

Case Number: T 0722/03 - 3.4.2

Application Number: 95909024.2

Publication Number: 0746760

IPC: G01N 23/00

Language of the proceedings: EN

Title of invention:
Detection of impurities in metal agglomerates

Patentee:
Corus UK Limited, et al

Opponent:
Thermo Electron (Erlangen) GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 100(a), 100(b)

Keyword:
"Inventive step (yes)"
"Sufficiency of disclosure (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0722/03 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 24 June 2005

Appellant: (Opponent)	Thermo Electron (Erlangen) GmbH Frauenauracher Strasse 96 D-91056 Erlangen (DE)
Representative:	Mörtel & Höfner Patentanwälte Blumenstrasse 1 D-90402 Nürnberg (DE)
Respondents: (Proprietors of the patent)	Corus UK Limited 15 Great Marlborough Street London W1V 2BS (GB) and CETTO MASCHINENBAU GmbH & Co. KG. Dechenstrasse 15 D-40878 Ratingen (DE)
Representative:	Hauck, Graalfs, Wehnert, Döring, Siemons, Schildberg Mozartstrasse 23 D-80336 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 6 May 2003 rejecting the opposition filed against European patent No. 0746760 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: A. G. M. Maaswinkel
J. H. P. Willems

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 28 June 2003, against the decision of the opposition division, dispatched on 6 May 2003, to reject the opposition against the European patent No. 0 746 760. The fee for the appeal was paid on 28 June 2003. The statement setting out the grounds of appeal was received on 4 September 2003.

II. Opposition had been filed against the patent as a whole on the basis of Article 100(a) and (b) EPC. The objection under Article 100(a) EPC had been based on the grounds that the subject-matter of the patent was not patentable within the terms of Articles 52 to 57 EPC because it lacked novelty and did not involve an inventive step. At the oral proceedings the appellant did not maintain the objection of lack of novelty. To support its objections the opponent referred inter alia to the following documents:

(D1) "Entdeckung radioaktiver Verunreinigungen in Stahlschrott", Untersuchungsbericht über die Feldversuche im Januar 1994 bei Cetto Maschinenbau in Ratingen

(D5) "Radioaktivitäts-Meßanlage FHT 1350 für Schrott", brochure of FAG Kugelfischer Georg Schäfer KGaA, Erzeugnisbereich Strahlenmesstechnik, issue 05/09/93

(D7) Part of a catalogue of Scintrex, CA, November 1986

(D8) DIN-Norm 25482, part 2, "Nachweisgrenze und Erkennungsgrenze bei Kernstrahlungsmessungen"

(D9) DIN-Norm 25482, part 5, "Nachweisgrenze und Erkennungsgrenze bei Kernstrahlungsmessungen"

(D10) DIN-Norm 25457, part 1, "Aktivitätsmessungen für die Freigabe von radioaktiven Reststoffen und kerntechnischen Anlagenteilen".

III. On 24 June 2005 oral proceedings were conducted.

IV. At the oral proceedings the appellant requested that the decision under appeal be set aside and that the patent be revoked.

V. The respondents requested that the appeal be dismissed and that the patent be maintained as granted.

VI. The wording of independent claim 1 reads as follows:

"A method of detecting the presence of radioactive impurities in a metal agglomeration comprising the steps of measuring in each of a plurality of discrete gamma ray energy bands the background gamma ray emission without the agglomeration in the measuring apparatus, measuring the combined emission from the agglomeration and background emission with the agglomeration present, determining the ratios of the measured emissions in each of the energy bands, and using the divergences of the ratios between the energy bands as an indicator of the presence of radioactive impurities in the agglomeration."

Claims 2 to 6 are dependent claims.

VII. The arguments of the appellant may be summarised as follows.

Document D1 presents the results of field tests of the detection of radioactive impurities in steel scrap. In Section 4.1.4 of this report it is disclosed that the measuring apparatus comprises a so-called M2 detector for the analysis of the energy spectrum in a plurality of discrete gamma ray energy bands. In a first measurement step the background gamma ray emission without the agglomeration in the measurement apparatus is detected ("Hintergrundwert", see Section 4.7.2). In a second measurement with the agglomeration being present a "Strahlungswert" is measured which corresponds to the combined emission of agglomeration and background emission. Therefore these corresponding features of claim 1 are known from document D1.

With respect to the further features of the claim, the opposition division had interpreted these features "determining the ratios" and "using the divergences of these ratios" narrowly in the sense that for each energy band a ratio of the two measurements is formed. Following this interpretation the method defined in claim 1 differs from the known detection method only in its data evaluation algorithm. According to the decision under appeal, the most simple and obvious way of comparing the spectra is to take the mathematical difference. However, for detecting the presence of radioactive impurities a simple subtraction of the spectra would provide poor results since it is known from D1, for instance see page 2, Section 2 and page 6,

Section 5.1, that the level of background emission may fluctuate and that it may be shielded by the presence of a lorry containing the agglomeration in the measurement apparatus. From the latter passage in D1 it is also implicitly clear that this shielding effect would be the same throughout the spectrum and hence reduce all components of the background spectrum proportionally. Furthermore it is well known that every spectral analysis in which the presence of a spectrally relevant component is to be detected is based on comparing two spectral curves, namely comparing a reference spectrum (*without the component*) with the actual spectrum of interest. The simplest practical way of comparing these spectra is to normalise the spectra and thereafter to form the difference of the normalised curves. In this context it is pointed out that in multichannel gamma ray spectrometers it is a standard routine to compute ratios of emissive species such as Uranium and Thorium, see document D7, second page, left column. Therefore, starting from the teaching of document D1 (*which emphasises that the background radiation may fluctuate*) it would be obvious for the skilled person to first normalise the data (*i.e. to form a relative contribution by division of the data of one spectral channel by dividing it by the data of all spectral channels*) and subsequently to compare the relative contributions (*by establishing a divergence between these*). In carrying out these well-known spectral data reduction steps he would arrive at the subject-matter of claim 1 without an inventive step being involved. It is added that the skilled person would be aware that this simple data reduction should be considered only as a first, qualitative estimate and that the quantitative establishment of the amount of

impurities would involve much more sophisticated methods for determining the absolute levels of impurities, as is illustrated by the DIN-norms in documents D8 to D10. In contrast, because the simple ratio-forming in claim 1 is such a basic and trivial measure being part of the standard toolkit of the skilled person it was not possible to document this with written documents.

As to the dependent claims, their additional features do not contribute to inventive step because they are known or obvious from document D1 (*claims 2, 4 and 5*) or do not further characterise the method of claim 1 (*claim 3*). With respect to claim 6 it is added that it is self-evident for the skilled person to use the level of emissions not only for qualitative but also for quantitative estimates, even if this is much more complicated and that it is obvious that a higher level of emission is correlated with a higher level of radioactive impurities. If, however, this claim should be construed that it relates to a method of actually "calculating" the level of contamination an objection under Article 100(b) EPC is raised since the patent specification does not disclose how this calculation should be carried out in any detail.

VIII. The arguments of the respondents may be summarised as follows.

The invention relates to the detection of radioactive impurities in scrap metals with a gamma ray detector arrangement. In Section 4.7.2 of the closest prior art document D1 a method is disclosed in which with a spectral resolving detector arrangement the background

gamma ray emission level without the metal agglomeration is measured, and in a further measurement the emission level of the combined contributions of the background and the metal agglomeration. Finally the difference between the background signal and the combined signal is determined. Therefore in this method the absolute value of the emission is determined.

The invention is based on the recognition that if a scrap load is introduced at the detector arrangement and the load does not contain any radioactive impurities the measured level of background radiation falls over the whole spectrum in the same proportion. By determining in all spectral bands the ratio of the measured intensities with and without the agglomeration these ratios should be the same if no contamination is present; furthermore a divergence between these ratios would be indicative of the presence of radioactive impurities. Therefore in the invention as defined in claim 1, the detection method is a relative method in contrast to the absolute method disclosed in the prior art. Thus the technical problem addressed in the invention is to provide a simple and alternative detection method. The claimed solution is not suggested by document D1 or any other available document, because in none of the documents is it recognised that the whole spectrum falls in the same proportion by the introduction of an uncontaminated load at the detector arrangement. This allows the application of a much simpler relative detection method. It is pointed out that the determination of the ratios as defined in claim 1 does not include a normalisation as argued by the appellant but merely the division of two measured intensities for every spectral band. Therefore the

subject-matter of claim 1, and equally of the dependent claims is patentable. The objection under Article 100(b) EPC against claim 6 is refuted, because the disclosure in Section [0016] of the patent specification is sufficiently detailed as to how the additional features in claim 6 are to be understood. The idea is that if after carrying out the method in claim 1 a divergence is found in one spectral band the skilled person will be able to carry out additional measures, for instance as disclosed in the DIN-norms in documents D8 to D10, in order to estimate the quantity of radioactive impurities present.

Reasons for the Decision

1. The appeal is admissible.

2. *Patentability*

2.1 *Novelty*

At the oral proceedings the appellant did not maintain the objection to lack of novelty. The board is satisfied that the subject-matter of claim 1 is novel as will become clear from the subsequent discussion of the features of the claim.

2.2 *Inventive step*

2.2.1 There was agreement between the parties that the closest prior art is disclosed in document D1. The parties also agreed that the detection method defined

in claim 1 differs from the measurement method in Section 4.7.2 of document D1 in the following features:
(i) determining the ratios of the measured emissions in each of the energy bands; and
(ii) using the divergences of the ratios between the energy bands as an indicator of the presence of radioactive impurities in the agglomeration.

2.2.2 The objective problem solved in claim 1 of the patent in suit can therefore be seen as providing an alternative method of detecting the presence of radioactive impurities.

2.2.3 According to the appellant for comparing two spectra it was a standard routine in the prior art to normalise the spectra. Furthermore the calculation of ratios was well known, for which reference was made to document D7. The appellant also argued that the step of calculating the ratio of two spectra was an elementary routine in spectral reduction, only involving basic technical knowledge of the skilled person, which was a reason that no written evidence for such a step could be provided.

2.2.4 The board does not share this view. The prior art, as illustrated by the disclosures in D1 and also D5, teaches to form the mathematical difference between the background emission spectrum without the agglomeration in the measurement apparatus and the spectrum of the combined background and agglomeration contribution. This step of calculating the difference is apparently carried out in order to estimate the absolute level of emission and to compare this with the threshold for alarm (D1, Section 5.1). Since this step of forming the

difference is essential for being able to calculate the absolute value it does not appear obvious why the skilled person would modify this data reduction method by forming the ratio of the spectra, because a comparison with an absolute threshold value would then be impossible.

2.2.5 The appellant equally argued that the normalisation of spectra was a standard feature in multichannel spectrometers. This is not put into question by the board. However, to the board's understanding the "normalisation" of a measured spectrum usually implies a division by one of the measured quantities of the same spectrum, for instance the integrated energy or summed-up counts or the maximum amplitude in one of the channels. This is different from the ratio defined in claim 1, which is a division between the information content of all energy bands of two different spectra.

2.2.6 The argument that in spectral data reduction it was an elementary step to divide two spectra is not persuasive. Such a division, c.q. forming the ratio of two spectra may or may not have been known at the priority date of the patent. The question would rather be with which aim the skilled person would carry out such a step. For instance, the computing of the ratios between Uranium and other elements disclosed in document D7 is apparently for uranium exploration and geological mapping (*first paragraph of D7*). This is a rather different purpose than the detection of radioactive impurities in a metal agglomeration which is the subject of the patent in suit. It is furthermore noted that the ratios in D7 are formed between two chemical

elements and not between the background emission and the combined emission of background and agglomeration.

2.2.7 It rather appears that before realizing that it was useful to compute the ratio of these spectra, the skilled person would have needed to grasp the fact that if a non-contaminated agglomeration is introduced before the detectors, the level of background ray emission falls in all detector channels in the same proportion, whereas radioactive impurities would result in diverging proportions in specific channels. The appellant had made reference to document D1, Section 5.1, which in its opinion would implicitly teach this. However, the board cannot identify such teaching, neither in this passage, nor in any other part of the available prior art. Without this recognition there is no obvious reason why the skilled person would have considered the data reduction of the method defined in claim 1 as a viable alternative to the known absolute difference taking method. Therefore in the opinion of the board the subject-matter of claim 1 involves an inventive step.

2.2.8 Claims 2 to 6 are appended to claim 1 and equally involve an inventive step.

3. *Objection under Article 100(b) EPC*

3.1 The appellant had argued that if dependent claim 6 was construed to define a method of actually "calculating" the level of contamination this would be objectionable under Article 100(b) EPC, since claim 1 is restricted to a relative measurement with which method it would be impossible to determine the absolute level of

impurities. For the support of the features of this claim the respondents had made reference to Section [0016] of the patent specification.

3.2 The board does not see any contradiction between the subject-matter of claim 1 and the additional features of claim 6. Claim 1 indeed defines a relative method in which the presence of radioactive emission in one or more spectral channels is determined by taking the ratios and looking for any divergences. To the board's understanding claim 6 does not define that the ratio or the divergence would be used to estimate the quantity of radioactive impurities. Rather such an estimation could be easily performed by the skilled person on the basis of the measured spectra by following the teaching of the patent specification and the known prior art. Therefore the objection under Article 100(b) EPC against claim 6 is not persuasive.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Dainese A. Klein