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Datasheet for the decision of 21 July 2015

Case Number: T 1118/11 - 3.4.02

Application Number: 00961110.4

Publication Number: 1319945

IPC: G01N27/62, H01J49/42

Language of the proceedings: EN

Title of invention:
PROBING METHOD USING ION TRAP MASS SPECTROMETER AND PROBING DEVICE

Applicant:
Hitachi, Ltd.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:

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Case Number: T 1118/11 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 21 July 2015

Appellant: (Applicant)	Hitachi, Ltd. 6 Kanda Surugadai 4-chome Chiyoda-ku, Tokyo 100-8010 (JP)
Representative:	Strehl Schübel-Hopf & Partner Maximilianstrasse 54 80538 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 16 December 2010 refusing European patent application No. 00961110.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairwoman	T. Karamanli
Members:	H. von Gronau
	F. J. Narganes-Quijano

Summary of Facts and Submissions

I. The appeal of the applicant is directed against the decision to refuse European patent application No. 00961110.4. The examining division refused the application in particular on the ground that the subject-matter of independent claim 1 of the then main request and of independent claim 7 of the then auxiliary request did not involve an inventive step.

With the statement of grounds of appeal the appellant maintained the main request on which the decision was based, filed a new first auxiliary request, in which the features of claim 2 of the main request were included in the independent claims, and it maintained the auxiliary request underlying the contested decision as second auxiliary request.

II. In a communication the board expressed the provisional opinion that the subject-matter of claim 1 of the main request appeared to involve an inventive step and that the dependent claims lacked clarity.

III. With a letter dated 15 May 2015 the appellant filed claims 1 to 8 of a new main request replacing the previous main request (with clarified dependent claims), and amended description pages 3 to 5.

IV. With a further letter dated 10 July 2015, the appellant informed the board as follows:

"*..., we note that our* ***new main request*** *as introduced with our previous letter of May 15,2015, is constituted of:*

pages 1, 2, and 6 to 25 of the description as filed upon entry into the EP regional phase,
amended pages 3 to 5 as filed with our letter of May, 15, 2015,
the set of eight further amended claims as filed with our letter of May 15, 2015, and
drawing sheets 1 to 12 as filed upon entry into the EP regional phase".

V. The appellant requests that the decision under appeal be set aside and a patent be granted on the basis of the application documents of the main request as confirmed with letter dated 10 July 2015, or on the basis of the claims of one of the auxiliary requests filed with the statement of grounds of appeal.

VI. The independent claims according to the main request read as follows:

"1. A detecting method using an ion trap mass spectrometer, comprising:
a first analysis step (201) of acquiring a mass spectrum;
a first decision step (202) of deciding whether ions of a first predetermined peculiar m/z are present on the basis of an analysis of the data resulting from the mass spectrometry in the first analysis step;
a second analysis step (203) of making tandem mass spectrometry only if the decision results from said first analysis step imply that ions of the first predetermined peculiar m/z are present; and
a second decision step (204) of deciding whether ions of a second predetermined peculiar m/z are present according to said mass spectrum obtained by said tandem mass spectrometry."

"8. A detecting device comprising:
a carrying mechanism (57) for carrying objects to be checked;
a carrying mechanism controller (58) for controlling the carrying speed of said carrying mechanism;
a gas-sucking portion (21, 54, 56) for sucking gas derived from said objects;
an ion source (20) for ionizing a sample contained in said gas by corona discharge;
an ion trap mass spectrometer (36-43) for making first mass spectrometry for analyzing ions generated by said ion source; and
a data processor (44) for deciding whether a dangerous substance exists on the basis of an analysis of the data resulting from said first mass spectrometry,
whereby only if it is decided that said gas contains said dangerous substance according to the data resulting from said first mass spectrometry, said carrying mechanism controller (58) is adapted to reduce the carrying speed of said carrying mechanism (57) on the basis of a signal from said data processor, and said data processor is adapted to order said ion trap mass spectrometer (36-43) to make a second mass spectrometry according to tandem mass spectrometry."

The main request also includes dependent claims 2 to 7 all referring back to claim 1.

VII. The following documents are pertinent for the present decision:

D2: McLuckey *et al.*, "High explosives vapor detection by glow discharge-ion trap mass spectrometry", Rapid communications in mass spectrometry, Wiley, US, vol. 10, no. 3, 1996, pp. 287-298.

D4: JP 2000-28579 A (SAKAIRI ET AL) 28 January 2000 (US 6 295 860 B1, 2 October 2001 is a family member of JP 2000-28579 and it is assumed to have the same disclosure in English; in the following reasons reference will be made to this US family member).

Reasons for the Decision

1. *Main request*

1.1 *Novelty (Article 54(1) EPC 1973)*

The novelty of the subject-matter of the independent claims was not put into question in the contested decision. The board sees also no reason to object novelty in view of the prior art on file.

1.2 *Inventive step of the subject-matter of independent claim 1 according to the main request (Article 56 EPC 1973)*

1.2.1 The examining division refused the application because the subject-matter of claim 1 did not involve an inventive step in view of documents D4 and D2.

1.2.2 Document D4 is regarded as the closest prior-art document. Document D4 discloses a detecting method for detecting explosives in luggage from the compounds in the air around the luggage. It uses an ion trap mass spectrometer (cf. column 8, lines 26-28) comprising an analysing step of acquiring a mass spectrum on selected ions. The ions are therefore dissociated by colliding

them with a neutral gas (helium) and the ions are accumulated in the analysing region before they are counted (cf. column 9, lines 6-27). Then it is decided whether a particular compound has been detected (cf. column 9, lines 54-64).

1.2.3 The method of the subject-matter of claim 1 differs from the method disclosed in document D4 in that first a mass spectrometry is performed on unfragmented precursor or parent ions, and tandem mass spectrometry is subsequently performed only when the result of the first step indicates a predetermined m/z value which is already indicative of a searched compound.

1.2.4 This provides a higher average detection speed while maintaining high selectivity in detecting the searched compounds (cf. page 25, lines 20-24 of the patent application).

1.2.5 The problem with respect to document D4 can be regarded as how to increase the speed of the ion trap mass spectrometry detecting procedure.

1.2.6 The board agrees with the examining division in that document D2 is of the same technical field and would be considered by a person skilled in the art when trying to solve the above problem in view of D4. Document D2 also deals with explosive detection in air by ion trap mass spectrometry (cf. title) and utilizes also fragmented ions in tandem mass spectrometry. Atmospheric samples are ionized by glow discharge and selected ions are accumulated by quadrupole ion trap and then converted to fragmented product ions (cf. D2, page 291, right-hand column, second paragraph). The detected ions of ion trap mass spectrometry and ion trap tandem mass spectrometry are analysed (cf. D2, first page, right-hand column,

first paragraph). On page 296, first paragraph on the right-hand column of D2 it is said that "*Specificity can be enhanced further, in favorable cases, by adding additional mass selection and ion isolation steps*".

1.2.7 From this passage and the other portions of the text on page 296 the examining division concluded that the skilled person would implement a true MS/MS analysis in D4. This document already had described a decision step as to whether precursor ions are present or not. According to the examining division, it would have been a matter of routine for the skilled person to perform in D4 an additional step of tandem mass spectrometry analysis "in favourable cases", i.e. if (and of course only if) a compound matching the m/z of an explosive or drug has been detected in the first MS analysis (cf. page 5 of the decision).

1.2.8 The board cannot share the conclusion of the examining division. The statement "in favorable cases" in document D2 relating to the additional mass selection and ion isolation steps does not specify in which cases additional steps are selected, let alone that these additional mass selection and ion isolation steps would include tandem mass spectrometry. In document D2 a tandem mass spectrometry is disclosed, but the document does not suggest that time can be saved by performing the tandem mass spectrometry only when the parent ion mass spectrometry has shown a particular m/z result. In D2 it is only said that ion accumulation takes time. D2 states: "*However, the point of this example is to illustrate that concatenated tailored waveforms can be used to devise a scheme that allows for the monitoring of several different targeted compounds in parallel, thereby trading specificity for speed*" (cf. sentence

bridging left-hand column and right-hand column on page 296).
"*The remarkable experimental flexibility of the ion trap with its capability for concatenated tailored waveforms is particularly advantageous in that trade-offs in speed, sensitivity and specificity can be made to suit the needs of the detection scenario*" (cf. page 296, right-hand column, point (ii)).

Document D2 therefore just suggests that the time to accumulate the selected ions and the stages performed is adjusted to the required specificity and speed. The two step analysis with a decision step in between that allows to keep the specificity while increasing the speed is not suggested by D2. The same is true for document D4. In document D4 there is an x-ray analysis before starting a mass spectrometry, but that is a different procedure. It cannot be regarded as suggesting a selective two step mass spectrometry.

1.2.9 None of the other cited documents suggests to perform the tandem mass spectrometry only if in a first analysing step ions of a predetermined peculiar m/z value are detected. The board comes therefore to the conclusion that the subject-matter of independent claim 1 is not obvious in view of the cited prior art documents.

1.3 This is also true for the subject-matter of the corresponding apparatus claim 8 of the main request.

1.4 Claims 2 to 7 are dependent on claim 1 and concern preferred embodiments of the method of claim 1. The subject-matter of these claims therefore also involves an inventive step.

1.5 The description has been adapted to meet the requirements of Rule 27(1) EPC 1973.

1.6 In view of the above the main request is allowable.

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 grant a patent in the following version:

Description:
Pages 1, 2 and 6 to 25 filed with entry into the regional phase, and
Pages 3 to 5 filed with the letter of 15 May 2015.

Claims:
Nos. 1 to 8 filed with the letter of 15 May 2015 as main request.

Drawings:
Sheets 1/12 to 12/12 filed with entry into the regional phase.

The Registrar: The Chairwoman:

M. Kiehl T. Karamanli

Decision electronically authenticated