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Datasheet for the decision of 21 January 2015

Case Number:	T 2159/10 - 3.4.02
Application Number:	02748373.4
Publication Number:	1377820
IPC:	G01N30/00, G01N30/62, G01N27/64, H01J49/00
Language of the proceedings:	EN

Title of invention:
METHOD AND APPARATUS FOR CHROMATOGRAPHY-HIGH FIELD ASYMMETRIC WAVEFORM ION MOBILITY SPECTROMETRY

Applicant:
THE CHARLES STARK DRAPER LABORATORY, INC.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Case Number: T 2159/10 - 3.4.02

DECISION
of Technical Board of Appeal 3.4.02
of 21 January 2015

Appellant:
(Applicant)

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Decision under appeal:

Decision of the Examining Division of the European Patent Office posted on 27 May 2010 refusing European patent application No. 02748373.4 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman B. Müller
Members: A. Hornung
F. Maaswinkel

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application number 02748373.4 on the basis of Article 56 EPC (main request and both auxiliary requests 1 and 2).

II. The applicant requested that the decision of the examining division be set aside and that a patent be granted on the basis of the main request or of any of auxiliary requests 1 to 2, all requests filed with the letter setting out the grounds of appeal.

As a precaution, the appellant requested oral proceedings.

III. In a communication annexed to the summons to oral proceedings, the board informed the appellant about its provisional and non-binding opinion, inter alia, on patentability of the claimed subject-matter. Reference was made to documents D1 [US 5,736,739], D2 [WO 01/008197] and D4 [US 5,420,424].

The board's opinion was worded as follows (see points 6 and 7 of the communication):

6. "Main request

6.1 Inventive step

Claim 1 is identical to claim 1 of the first auxiliary request as refused by the examining division.

The board currently tends to share the view of the examining division as expressed in its decision under appeal, points 1 to 10 of the reasons for the decision.

Starting from D2 as closest prior art, the subject-matter of claim 1 seems to differ from the device of D2 in that it comprises the following features:

Feature F1: "a section for gas chromatographic (GC) analysis of a gas sample, the GC section (10A) coupled to the inlet section (16)",

Feature F2: "an apparatus (30) for the generation of complementary data for evaluation of a chemical compound in the sample, that data including retention time",

Feature F3: "a display coupled to the output section (31) arranged for display of at least two dimensional data representative of detected species".

6.1.1 Feature F1

D2 discloses a Field Asymmetric Ion Mobility (FAIM) device. However, D2 leaves open the nature of the sample gas which is input to the FAIM device. Therefore, when putting into practice the device of D2 as shown in figure 1, the skilled person would necessarily have to solve the problem of providing an adequate gas sample (12) at the inlet (16) of the device of D2.

The skilled person will take account of the objective of D2 which is to produce a complete spectrum for a given gas sample comprising a plurality of different species (page 13, lines 4-7). Moreover, as described in D2, pages 1 and 2, devices for identifying chemical species in a gas should preferably have high resolution or selectivity.

As exemplified by D1, it is known in the art to use gas chromatographic (GC) devices at the input of FAIM devices to improve selectivity in the identification of various species *in the gas sample (see D1, column 2, lines 23-29; column 5, lines 8-17). Therefore, when solving the problem of providing an adequate gas sample (12) at the inlet (16) the skilled person will consider the provision of a gas sample having passed through a GC device as an obvious way to further improve the resolution of the identification of species.*

It follows that the board is unable to see an inventive step in providing a GC device at the input of the FAIM device of D2.

6.1.2 Feature F2

The FAIM device of D2 alone generates intensity data of the detected ion species. Once the FAIM device is operated in combination with a GC device (see feature F1), the combined GC and FAIM devices inherently generate data including retention time and intensity of the detected ion species. Indeed, intensity data for various ion species is generated by the FAIM device at various points in time, separated by the retention time specific to each ion species.

Therefore, feature F2 is inherently present in a combined GC and FAIM device.

6.1.3 Feature F3

Feature F3 may be seen to solve the problem of how to inform the user of the measuring device in the best possible manner about the characterized species in the gas sample.

As explained above (feature F1), the user of the FAIM device of D2 would obviously use a gas sample which originates from a GC device. By flowing through the GC device, it is explained in D1, column 5, lines 2-8, that "each analyte species of interest will experience a transit time through *the capillary column [i.e. a GC device] different from the other analyte species present in the carrier gas slug (...). This transit time is known as the retention time".*

This means that the "retention time" is another characteristic of each ion species, additional to the compensation voltage and the intensity data generated by the FAIM device as such. Making use of these two or three pieces of information improves the selectivity of the measurements obtained from the combined GC-FAIM device. Moreover, displaying at least the retention time, the compensation voltage and the intensity data on one single graph or screen appears to be the most efficient and clearest representation of the three pieces of information.

The board cannot see any surprising effect or any technical difficulties in implementing a display providing such a two-dimensional display of data.

6.1.4 Applicant's counter-arguments (see letter of 6 October 2010, page 4)

One of the applicant's main counter-arguments appears to be based on the allegation that "while D1 discloses a GC-FAIMS device, the FAIMS of D1 has a cylindrical structure and is, therefore, too slow to provide complementary GC retention and FAIMS ion intensity data".

Moreover, the applicant is of the view that claim 1 is not simply a juxtaposition, but a "synergistic combination of a GC and a planar electrode FAIM".

Finally, the applicant notes that "the invention solves the problem of how to provide more meaningful and robust data for the evaluation of chemical compounds of a gas sample" and *goes on arguing that "D2 provides no hint which would lead the skilled person to even consider the stated problem".*

The board is currently not convinced by these arguments because

(i) D1, via its referral to the FAIM design of D4, discloses not only the use of cylindrical electrodes, but also considers the use of planar electrodes (see e.g. claim 3 of D4),

(ii) the meaning of the expression "complementary data" of claim 1 is unclear and certainly cannot be interpreted as implying some "synergistic combination of GC and planar electrode FAIM components" which distinguishes the claimed device from the modified GC-FAIM device of D2,

(iii) providing more meaningful and robust data for the evaluation of chemical compounds of a gas sample is considered by the board as a natural attitude of the skilled person when trying to put into practice the device of FAIM of D2.

6.1.5 In conclusion, the subject-matter of claim 1 appears to lack an inventive step in view of the disclosure of D2 in combination with the disclosure of D1.

6.2 Clarity

Notwithstanding the above objection of lack of inventive step, claim 1 appears to lack clarity at least for the following reason.

Since the claimed apparatus (30) is defined purely in functional terms using unspecified wording (e.g.

"complementary data"; "retention time") and in terms of a result to be achieved (i.e. "for generating data ... including retention time and intensity"), its technical features remain obscure.

7. *Auxiliary requests 1 and 2*

7.1 *Clarity*

Claims 1 of the two auxiliary requests 1 and 2 seem to lack clarity at least for the same reasons as claim 1 of the main request. Moreover, the intended limitation of the feature "the intensity at each GC peak retention time being "based" on a scan of the compensation voltage" is unclear.

7.2 *Inventive step*

The features added to claim 1 of auxiliary requests 1 and 2 appear to be:

- *known from D1 (e.g. scanning a compensation voltage),*
- *a direct consequence of using the combined GC-FAIM device of D2 and D1 (e.g. intensity is based on a scan of the compensation voltage) or*
- *an obvious possibility for the skilled person to use the combined GC-FAIM device of D2 and D1 efficiently (e.g. plot of compensation voltage versus retention time; pattern recognition part).*

Therefore, it is doubtful that the subject-matter of claim 1 of any of auxiliary requests 1 and 2 comprises an inventive step."

IV. In response to the summons to oral proceedings, the appellant's representatives informed the board with their letter dated 14 January 2015 that they would not be attending the oral proceedings. They filed no comments concerning the board's preliminary opinion as annexed to the summons.

Oral proceedings were held on 21 January 2015.

V. Independent claim 1 according to the main request reads as follows:

"1. A system (10) for generating multiple data for characterizing a chemical species in a gas sample, comprising

an inlet section (16) , an ionization section (17), an ion filtering section (24), an output section (31) for ion species detection, a control section, and

a section for gas chromatographic (GC) analysis of a gas sample, the GC section (10A) coupled to the inlet section (16), and

the ionization section (17) disposed for ionizing a gas sample from the GC section (10A), the ionized sample passing to an ion filter (20, 22) in the ion filter section (24),

the control section (10C) applying a high field asymmetric period voltage and a control function to the ion filtering section (24) to control species in the sample that are passed by the ion filter (24) to the output section (31) for detection, wherein the ion filtering section (24) comprises at least one substrate (52) and the ion filter (20, 22) comprises at least one planar electrode (20) on the substrate (52), wherein the electrode is isolated from the output section by the substrate,

an apparatus (30) arranged for generation of complementary data for evaluation of a chemical compound in the sample, that data including retention time and intensity of the detected ion species, and a display coupled to the output section (31) arranged for display of at least two dimensional data representative of detected species."

Independent claim 1 according to the first auxiliary request reads as follows:

"1. A system (10) for generating multiple data for characterizing a chemical species in a gas sample, comprising

an inlet section (16) , an ionization section (17), an ion filtering section (24), an output section (31) for ion species detection, a control section, and

a section for gas chromatographic (GC) analysis of a gas sample, the GC section (10A) coupled to the inlet section (16), and

the ionization section (17) disposed for ionizing a gas sample from the GC section (10A), the ionized sample passing to an ion filter (20, 22) in the ion filter section (24),

the control section (10C) applying a high field asymmetric period voltage and a control function to the ion filtering section (24) to control species in the sample that are passed by the ion filter (24) to the output section (31) for detection, the control function controlling a compensation voltage applied to the ion filter (24), wherein the ion filtering section (24) comprises at least one substrate (52) and the ion filter (20, 22) comprises at least one planar electrode (20) on the substrate (52), wherein the electrode is isolated from the output section by the substrate,

an apparatus (30) arranged for generation of complementary data for evaluation of a chemical compound in the sample, that data including a chromatogram of GC peak retention times and associated intensities of the detected ion species, the intensity at each GC peak retention time being based on a scan of the compensation voltage, and

a display coupled to the output section (31) arranged for display of at least two dimensional data including a plot of compensation voltage versus retention time representative of detected species."

Independent claim 1 according to the second auxiliary request consists of all the features of claim 1 of the first auxiliary request and the following feature added at the end of that claim 1:

"wherein the control section (10C) further comprises a pattern recognition part for identification of an ion species according to data detected at the output section".

Reasons for the Decision

1. In the annex to the summons, the board expressed its preliminary view, along with the underlying reasons, that, inter alia, the subject-matter of claim 1 of the main, first and second auxiliary requests lacked an inventive step (Article 56 EPC 1973) and that the appellant's arguments in favour of inventive step, filed with the grounds of appeal, were not convincing. See point III above.

2. The appellant neither attempted to rebut the board's provisional opinion, nor submitted any new requests aiming at overcoming the objections.

   The board sees no reason to deviate from its preliminary opinion regarding inventive step, which therefore becomes final.

3. It follows that the present patent application does not meet the requirements of Article 56 EPC 1973 for the reasons set out in the board's preliminary opinion.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts
Boards of Appeal of the European Patent Office
Chambres de recours de l'Office européen des brevets

M. Kiehl B. Müller

Decision electronically authenticated