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**Datasheet for the decision  
of 5 March 2021**

**Case Number:** T 0850/18 - 3.4.02

**Application Number:** 11709698.2

**Publication Number:** 2577263

**IPC:** G01N21/15, G01N21/33, G01J3/02,  
G01N21/09

**Language of the proceedings:** EN

**Title of invention:**  
DEVICE FOR UV-SPECTROMETRIC ANALYSIS OF GASEOUS COMPOUNDS

**Applicant:**  
One Sense S.A.

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
Inventive step (yes - amended claims)



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 0850/18 - 3.4.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.02**  
**of 5 March 2021**

**Appellant:** One Sense S.A.  
(Applicant) 25, Cité Morisacker  
7735 Colmar-Berg (LU)

**Representative:** Brann AB  
P.O. Box 3690  
Drottninggatan 27  
103 59 Stockholm (SE)

**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 8 January 2018  
refusing European patent application No.  
11709698.2 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** R. Bekkering  
**Members:** F. J. Narganes-Quijano  
B. Müller

## Summary of Facts and Submissions

- I. The appellant lodged an appeal against the decision of the examining division refusing European patent application No. 11709698.2
  
- II. During the first-instance proceedings reference was made *inter alia* to the following documents:
  - D1: US 6305213 B1
  - D3: "Analysis of the Gas Phase of Cigarette Smoke by Gas Chromatography Coupled with UV-Diode Array Detection", D. G. Hatzinikolaou *et al.*; *Analytical Chemistry*, Vol. 78 (2006); pages 4509 to 4516
  - D4: US 5135304 A.
  
- In the decision under appeal the examining division held in respect of the request then on file (application documents as originally filed) that the subject-matter of claim 1 did not involve an inventive step in view of document D3 as closest state of the art in combination with the disclosure of document D4 (Article 56 EPC).
  
- III. In reply to a communication annexed to summons to oral proceedings, the appellant made further submissions.
  
- IV. Subsequently, with the letter dated 18 February 2021 in reply to a further communication issued by the board, the appellant submitted claims 1 to 14, and amended pages 1, 1a, 1b, 3 to 5, 7, 11 and 12 of the description.

The appellant requested as main and sole request that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 14 filed with the letter dated 18 February 2021, together with pages 1 to 12 of the description and drawing sheet 1/1 of the application as filed, amended by means of the replacement pages 1, 1a, 1b, 3 to 5, 7, 11 and 12 filed with the letter dated 18 February 2021 replacing the corresponding pages of the description.

V. Subsequently, the oral proceedings were cancelled.

VI. Claim 1 of the main request reads as follows:

"A device (20) for UV-spectrometric analysis of gaseous compounds in a UV radiation range with wavelengths shorter than 190 nm, said device (20) comprising:

- a measurement channel (5) intended to accommodate a flow of sample gas to be analyzed,

- a window member (16) transparent for ultraviolet radiation arranged at a first end (5a) of the measurement channel (5),

- a radiation source (11) capable of generating ultraviolet radiation arranged to emit radiation through the window member (16) and into the measurement channel (5),

- a spectrographic member (3) for measuring of ultraviolet radiation emitted by the radiation source (11) arranged at a second, opposite, end (5b) of the measurement channel (5),

wherein the device (20) is arranged such that ultraviolet radiation entering the measurement channel (5) at the first end (5a) can propagate through the measurement channel (5), interact with the accommodated gas and be measured by the spectrographic member (3) at the second end (5b) of the measurement channel (5),

wherein the first end (5a) of the measurement channel (5) is open towards the window member (16), a channel (6, 18) for guiding a protection gas is arranged in connection to the window member (16) such that protection gas fed through the protection gas channel (6, 18) is allowed to flow over and cover the side of the window member (16) facing the measurement channel (5) and to flow further into the measurement channel (5), and the spectrographic member (3) is provided with an opening (12) through which ultraviolet radiation passes into the spectrographic member (3) during operation of the device (20), wherein the second end (5b) of the measurement channel (5) is open towards the spectrographic member (3) such that an inside of the spectrographic member (3) and the measurement channel (5) are in communication via said opening (12), wherein the spectrographic member (3) is arranged to be filled with a protection gas, and wherein the device (20) is arranged such that protection gas fed to the spectrographic member (3) is allowed to flow through said opening (12) and into the measurement channel (5), and further wherein the radiation source (11) is a deuterium lamp, and wherein the window member (16) forms an integrated part of the deuterium lamp."

The main request also includes dependent claims 2 to 14 referring back to claim 1.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Amendments*

2.1 The board is satisfied that the claims of the present main request meet the requirements of Article 123(2) EPC. In particular,

- claim 1 is based on claim 1 as originally filed, together with the features of dependent claims 4, 13 and 14 as originally filed, and the passage on page 6, lines 15 to 18, of the description of the application as filed, and

- dependent claims 2 to 14 are based on dependent claims 2, 3, 5 to 12 and 15 to 17 as originally filed, respectively.

2.2 The amendments made to the description relate to the adaptation of its content to the invention as defined in the present claims (Rule 42(1)(c) EPC), and to the acknowledgement of the pertinent state of the art (documents D3 and D4) in the introductory part of the description (Rule 42(1)(b) EPC).

3. *Novelty*

3.1 Document D1 discloses a device for carrying out UV-spectrometric analysis of gaseous compounds (Fig. 1, together with the abstract, and column 2, lines 29 to 31). The device comprises a measurement channel (Fig. 1, duct 4) through which the sample gas to be analysed flows, a radiation source of ultraviolet radiation (Fig. 1, radiation  $I_0$ ) arranged to emit radiation through a window member (window 10b) arranged at a first end of the measurement channel into the measurement channel, and a spectrographic member (detector 14 in Fig. 3a to 4c) for measuring the ultraviolet radiation and arranged at a second,

opposite end of the measurement channel (see column 2, lines 20 to 58, and column 4, lines 3 to 48).

The device defined in claim 1 differs from the device of document D1 in several respects. In particular, document D1 is silent as to the provision of the radiation source in the form of a deuterium lamp having the window member as an integrated part thereof, and as to the provision of means arranged to guide protection gas into the measurement channel through both ends of the channel as claimed, and more particularly as to the provision of means arranged to guide protection gas fed to the spectrographic member into the measurement channel through the second end of the measurement channel as claimed.

- 3.2 Document D3 discloses a device for carrying out UV-spectrometric analysis of gaseous compounds (Fig. 1, together with the corresponding description). The device comprises a measurement channel (Fig. 1, flow-cell tube) through which the sample gas to be analysed flows, a radiation source of ultraviolet radiation (Fig. 1, deuterium UV lamp) arranged to emit radiation through a window member (Fig. 1, sapphire window) arranged at a first end of the measurement channel into the measurement channel, and a spectrographic member (Fig. 1, monochromator and diode array detector) for measuring the ultraviolet radiation and arranged at a second, opposite end of the measurement channel (paragraph bridging pages 4550 and 4511).

The device defined in claim 1 differs from the device of document D3 in the following features:

- a) the provision of the window member as an integrated part of the deuterium lamp;

b) the provision of means arranged to guide protection gas into the measurement channel through the first end of the channel as claimed; and

c) the provision of means arranged to guide protection gas fed to the spectrographic member into the measurement channel through the second end of the measurement channel as claimed.

3.3 Document D4 discloses a gas analysis system (Fig. 2 and 2A, together with the corresponding description) suitable for the spectrometric analysis of gaseous compounds (gas sample 52) fed into the system (see column 1, lines 14 to 45, in particular lines 34 to 45). The system comprises a measurement channel (the section of chamber 26 enclosed by the housing 24 and located between the right and the left of the four detector channels 36 in Fig. 2 and 2A, see column 7, lines 66 and 67, see also Fig. 3) arranged to accommodate a flow of the sample gas to be analysed, a window member transparent to the radiation (Brewster window 22, see column 7, lines 57 to 62, and column 8, lines 27 to 41) arranged at a first end of the measurement channel, a radiation source (plasma discharge tube 16, see Fig. 1, together with column 7, lines 46 to 62) having the window member as an integrated part thereof (see Fig. 1) and arranged to emit radiation through the window member and into the measurement channel, and a spectrographic member (the left detector channel 36 in Fig. 2 and 2A, together with the associated gas identification and concentration analyser, see column 8, lines 48 to 59, together with column 1, line 60, to column 2, line 2, and column 3, lines 46 to 50; see also detectors 136 of Fig. 3) arranged at the opposite end of the measurement channel to measure the radiation after having interacted with the gas.



In addition, in document D4 the end of the channel is open towards the window member (see buffer region 30 in Fig. 2A), and an additional channel (see channel associated to buffer gas inlet or input port 40) for guiding protection gas is arranged in connection with the window member such that protection gas fed through the additional channel is allowed to flow over and cover the side of the window member facing the main measurement channel (see arrows in Fig. 2A, together with abstract, lines 7 to 16; column 7, line 67, to column 8, line 9; column 8, line 65, to column 9, line 2; and column 9, line 64, to column 10, line 1).

The device defined in claim 1 differs from the device disclosed in document D4 in the following features:

A) while in document D4 the radiation source is a plasma discharge tube, in claim 1 the radiation source is a deuterium lamp emitting UV radiation, and the components of the device are configured to be operable in the ultraviolet wavelength region shorter than 190 nm;

B) while the device of document D4 is arranged so that the protection gas fed through the protection gas channel and allowed to flow over the side of the window member facing the measurement channel is extracted before entering the measurement channel (see arrows and output port 44 in Fig. 2A; see also Fig. 4), the claimed device is arranged to further allow the protection gas to flow into the measurement channel; and

C) while in document D4 the spectrographic member is only optically coupled to the measurement channel (Fig. 3, and column 10, lines 64 to 68), claim 1 further requires means arranged to guide protection gas

fed to the spectrographic member into the measurement channel as claimed.

3.4 The remaining documents on file are less relevant to the issue of novelty of the claimed invention.

3.5 The board concludes that the subject-matter of claim 1 of the main request, and therefore also that of dependent claims 2 to 14, is new over the documents of the state of the art on file (Articles 52(1) and 54(1) EPC).

#### 4. *Inventive step*

4.1 In its decision the examining division considered document D3 to represent the closest state of the art and held that the subject-matter of claim 1 of the request then on file - and which required feature b) mentioned in point 3.2 above, but not features a) and c) - did not involve an inventive step in view of document D3 in combination with the disclosure of document D4.

4.1.1 As regards the distinguishing feature b) of claim 1, the examining division was of the opinion that the feature solved the problem of avoiding damage and contamination of the window member by components of the sample gas, that document D4 taught the provision of means (see point 3.3 above) for generating a flow of a buffer gas for the purpose of protecting the window member from contaminants present in the gas sample to be analysed (column 8, line 65, to column 9, line 21), and that the skilled person would include these means in the device of document D3 in order to solve the

mentioned problem, so that feature b) did not establish an inventive step.

However, the window member of document D3 is a sapphire window positioned on the side of the UV lamp of the device (Fig. 2) for the purpose of delimiting the gas channel and protecting the UV lamp, and document D4 teaches the replacement of windows having such a gas-channel delimiting and protective function by dams or curtains of a protection gas between the analyte gas and the optical elements to be protected (abstract, lines 1 to 5 and 21 to 25; column 2, lines 3 to 9 and 14 to 35; column 3, lines 57 to 64; and column 9, lines 32 to 35), while only retaining any other window having a specific optical function in the device such as the Brewster window 22 of the system of Fig. 2A of document D4 - which window, although also having the function of delimiting the gas channel and protecting the discharge tube 16, has the additional function of controlling the polarization state of the radiation within the laser resonant cavity of the system (column 2, lines 9 to 13; column 8, lines 20 to 27, together with lines 41 to 45; and column 9, lines 8 to 35). Therefore, the application of the teaching of document D4 to the device of document D3 would result in the sapphire window on the side of the UV lamp of the system of document D3 (Fig. 2) being replaced by a dam or curtain of protection gas - possibly with the UV lamp being inserted within the resulting protection gas channel -, but - contrary to the examining division's view - not in maintaining the mentioned window and positioning it within a channel of protection gas as claimed.

Therefore, neither document D4, nor a combination of document D3 with document D4, would suggest the skilled person to include in the device of document D3 means

arranged to guide protection gas into the measurement channel through the first end of the channel as specified in feature b) of claim 1.

4.1.2 In addition, neither document D4, nor the remaining documents on file (in particular document D1, see point 3.1 above), disclose or suggest the provision of the window member as an integrated part of the deuterium lamp disclosed in document D3 (*cf.* distinguishing feature a)), nor further improving the protection of the device by the provision of additional means arranged to guide protection gas fed to the spectrographic member into the measurement channel through the second end of the measurement channel as defined in claim 1 (*cf.* distinguishing feature c)).

4.1.3 Therefore, the subject-matter of claim 1 does not result in an obvious way from the device of document D3 as closest state of the art.

4.2 Alternatively, document D4 is considered *arguendo* as representing the closest state of the art.

While in document D4 the arrangement of the components constituting the spectrographic member (point 3.3 above) is optically coupled to the measurement channel, but not physically open towards the measurement channel (see Fig. 3), in the claimed device the spectrographic member is open towards the measurement channel and the claimed means arranged to guide protection gas fed to the spectrographic member into the measurement channel (*cf.* feature C) of claim 1 mentioned in point 3.3 above) allow the protection gas supplied to the spectrographic member to remove interfering gases from the spectrographic member and from at least part of the measurement channel, while preventing sample gas to

escape (page 6 of the description, second paragraph).  
In addition, none of the documents on file discloses or suggests this alternative arrangement and the technical effects associated therewith.

Therefore, already for this reason the device of claim 1 does not result in an obvious way from the device of document D4 as closest state of the art and the documents on file.

4.3 The board concludes that the subject-matter of claim 1 of the main request, and therefore also that of dependent claims 2 to 14, involves an inventive step over the documents of the state of the art on file (Articles 52(1) and 56 EPC).

5. In view of the above considerations, the board concludes that the application documents amended according to the present main request meet the requirements of the EPC.

## **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:
  - claims: Nos. 1 to 14 filed with the letter dated 18 February 2021;

- description: pages 1, 1a, 1b, 3 to 5, 7, 11 and 12 filed with the letter dated 18 February 2021, and pages 2, 6 and 8 to 10 of the description of the application as filed; and
- drawings: sheet 1/1 of the application as filed.

The Registrar:

The Chairman:



A. Voyé

R. Bekkering

Decision electronically authenticated