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**Datasheet for the decision
of 19 July 2007**

Case Number: T 0388/05 - 3.4.02

Application Number: 98930165.0

Publication Number: 0995105

IPC: G01N 21/15

Language of the proceedings: EN

Title of invention:

In-line cell for absorption spectroscopy

Applicant:

L'AIR LIQUIDE, Société Anonyme pour l'Etude
et l'Exploitation des Procédés Georges Claude

Opponent:

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Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step: no"

Decisions cited:

-

Catchword:

-



Case Number: T 0388/05 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 19 July 2007

Appellant: L'AIR LIQUIDE, Société Anonyme pour l'Etude
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 9 November 2004
refusing European application No. 98930165.0
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. Klein
Members: M. Stock
C. Rennie-Smith

Summary of Facts and Submissions

I. The applicant and appellant has appealed against the decision of the examining division refusing European patent application 98 930 165.0 (publication WO 99/02969 A1) under Article 97(1) EPC in connection with Rule 71a and Articles 123(2), 54(1) and (2), 56 and 84 EPC. The following documents were cited inter alia:

D2: US 4 749 276

D3: EP 0 456 202 A2

D4: US 5 565 985

The appellant has requested that a patent be granted on the basis of claims according to a main request or an auxiliary request filed with the grounds of appeal statement. Its arguments in favour of the patentability of the claimed subject-matter can be summarised as follows:

The problem to be solved by the invention is now how to heat the mirror in an effective way while at the same time preventing accumulation of deposits on it. The solution is the double function of the same means (the gas) which is heated to avoid condensation on the mirror while at the same time the flow of gas, having a certain velocity, prevents accumulation of deposits on the same mirror. This solution to the above problem is nowhere suggested in D2.

- II. In an annex to the summons to the oral proceedings requested by the appellant, the Board stated its provisional view that the claimed subject-matter is not novel.
- III. As a reaction to the summons the appellant filed claims according to second to fifth auxiliary requests and argued that document D2 did not disclose two inlets, one for the sample gas and another for the purge gas, as is defined in claim 1 of these requests.
- IV. In the oral proceedings on 19 July 2007 the appellant requested that a patent be granted on the basis of claim 1 according to the fourth auxiliary request as the new main request or on the basis of the fifth auxiliary request as the only remaining auxiliary request.
- V. Versions of claim 1 underlying this decision read as follows:

Main request:

"1. A system for performing an absorption spectroscopy measurement in a cell comprising:

a sample region (202) comprising a sample inlet port (216), an exhaust port (218) with the gas sample passing through the cell from inlet port into sample region (202) and out of the cell through exhaust port;

a light entry port (212) in communication with the sample region (202) to allow a light beam to enter the cell (200) and pass through the sample region (202), a

light exit port (212) in communication with the sample region to allow a light beam after passing through the sample region (202) to exit the the cell (200), the light entry port and light exit port being the same or separate ports, each said port containing a light transmissive window (214), a mirror (210) having a light reflective surface facing the sample region for reflecting the light beam within the cell (200), and a heater (224) effective to heat the light reflective surface of the mirror,

a purge inlet effective to introduce a heated purge gas stream which contacts the mirror (210) for the purpose of heating the mirror and for the purpose of preventing accumulation of deposits on the light reflective surfaces,

a light source (202) for generating a light beam which passes through the light entry port (304) into the cell, and a main detector (306) for measuring the light beam exiting the cell through the light exit port,

a heater for heating each light transmissive window (214)."

Auxiliary request:

"1. A system for performing an absorption spectroscopy measurement in a cell comprising:

a sample region (202) comprising a sample inlet port (216), an exhaust port (218) with the gas sample passing through the cell from inlet port into sample region (202) and out of the cell through exhaust port;

a light entry port (212) in communication with the sample region (202) to allow a light beam to enter the cell (200) and pass through the sample region (202), a light exit port (212) in communication with the sample region to allow a light beam after passing through the sample region (202) to exit the the cell (200), the light entry port and light exit port being the same or separate ports, each said port containing a light transmissive window (214), a mirror (210) having a light reflective surface facing the sample region for reflecting the light beam within the cell (200), and a heater (224) effective to heat the light reflective surface of the mirror,

a purge inlet effective to introduce a purge gas stream, which is heated, which contacts the mirror (210) for the purpose of heating the mirror and for the purpose of preventing accumulation of deposits on the light reflective surfaces,

a light source (202) for generating a light beam which passes through the light entry port (304) into the cell, and a main detector (306) for measuring the light beam exiting the cell through the light exit port,

a heater for heating each light transmissive window (214)."

Reasons for the Decision

1. The subject-matter of claim 1 according to the main and auxiliary request differs from what is disclosed in document D2, see Figure 4 with the connected description, in that

(i) the cell comprises a sample inlet port and a purge gas inlet, while D2 utilises one inlet only for sample and purge gases;

(ii) the purge gas is heated and contacts the mirror to heat the mirror and to prevent the accumulation of deposits on the light reflecting surfaces; and

(iii) in that the cell comprises a heater for heating each light transmissive window.

Features (i) to (iii) serve different purposes within the general problem related to the formation of deposits from sample gases on various optical surfaces of the cell.

2. Feature (i) defines the gas circulation in a type of cell which is placed in the exhaust line of the processing unit for e.g. semiconductors, the exhaust gases of which are to be analysed, and thus allows the simultaneous introduction of sample gas and purge gas by different inlets. However, this type of cell is well-known and described e.g. in document D4, see "Abstract" and "Summary of the Invention", comprising "a chamber through which particulate matter flows", and

- purge gas inlets (26), see Figure 1 and column 3, lines 60 to 64.
3. In D4 the purge gas flows over the windows for the explicit purpose of preventing the accumulation of deposits. It was thus evident to the person skilled in the art that such purge gas flow should also be applied to any optical surface of a cell prone to undesirable condensation effects, including the reflecting surfaces in D2. Protection of an optical surface against deposition in a similar analysis cell through a flow of purge gas over the surface is also known from document D3, see Figure 3 and column 5, lines 19 to 36.
 4. As far as heating of the purge gas according to feature (ii) is concerned, reference is made to D2, column 5, lines 27 to 35, disclosing pre-heating of the gas sample by the heating fluid line plumbed in parallel with the gas entry line and co-insulated, for further reducing condensation. Since the purge gas is introduced by the same inlet, it is heated as well. Document D3 also recommends heating of the cell surface and sample gas to avoid cold wall effects and the resulting deposition of particles, see column 4, lines 7 to 22. Introducing cold purge gas in the cell would indeed reduce the effectiveness of such heating. It was therefore obvious for the skilled person to pre-heat the purge gas when it is provided by a separate inlet as in D4, which then has the effect of heating the mirrors and preventing the accumulation of deposits on the light reflective surfaces.

5. The cell described in D4 comprises a heater (28) for heating each light transmissive window (54, 56) so as to limit its degradation in operation, see Figure 3 and column 8, lines 1 to 13. It was therefore obvious for the skilled person to apply this measure to the cell of D2 which already discloses heating elements bonded to the back of the mirrors, see column 4, lines 31 to 39, in order to solve the problem of contamination by deposits not only on the mirrors but also on the light transmissive windows in the meaning of feature (iii).

6. The appellant has advanced the argument that D2 is quite different from the teaching of the patent, in that it does not provide two gas inlets but only one inlet "through which gas may be circulated through the cell to purge the cell or to introduce a sample gas". As a consequence, either the gas sample to be analysed or the purge gas is introduced into the cell at a certain time. If simultaneous injection of a sample gas and a purge gas through the same inlet were assumed, the same gas would be injected as a sample gas and as a purge gas, which in turn would mean that the purge gas contains the same impurities as the sample gas and thus would not fulfil the function of the purge gas of the patent, i.e. an injection localised on the mirrors, which prevents accumulation of deposits on the mirror surfaces and provides additional heat to the mirror.

7. This argument is, however, not considered persuasive by the Board in view of document D4 disclosing, as was shown above, separate inlets for the purge gas which is directed to the windows. Heating of the cell and the gas introduced in it is used in the system described in D2. The effect of preventing accumulation of deposits

on the optical surfaces by maintaining them at an elevated temperature was also known from D2 and D4. It was thus obvious to use a heated purge gas directed to the optical surfaces, which also heats these surfaces.

8. Therefore, taking due account of the arguments of the appellant, the Board concludes that the subject-matter of claim 1 according to both the main and auxiliary requests does not involve an inventive step within the meaning of Article 56 EPC. Claim 1 of the auxiliary request differs only by the replacement of the expression "heated gas stream" in claim 1 of the main request by the entirely equivalent expression "gas stream, which is heated".

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

S. Sánchez Chiquero

A. G. Klein