BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File No.: T 0628/92 - 3.2.4

Application No.: 86 902 122.0

Publication No.: 0 214 277

Classification: F04B 37/08

Title of invention: Cryopump regeneration method and apparatus

D E C I S I O N
of 28 September 1993

Proprietor: Helix Technology Corporation

Opponent: Leybold Aktiengesellschaft

Headword:

EPC: Art. 56 EPC

Keyword: "Inventive step (yes)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0628/92 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 28 September 1993

Appellant:
(Opponent)

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Decision under appeal:

Decision of the Opposition Division of the European Patent Office dispatched on 18 May 1992 rejecting the opposition filed against European patent No. 0 214 277 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: C.A.J. Andries
Members: M.G. Hatherly
J.-P. Seitz

Summary of Facts and Submissions

I. European patent No. 0 214 277 was granted on 13 June 1990 on the basis of European patent application No. 86 902 122.0 filed on 3 March 1986.

Independent Claim 1 reads as follows:

"A method of regenerating a cryopump comprising warming the cryopump to evaporate or release previously condensed or adsorbed gases characterized by simultaneously evacuating the cryopump with an ejector pump actuated by a substantially inert fluid."

Independent Claim 6 reads as follows:

"A vacuum system for performing the method of claim 1 comprising a cryopump for evacuating a chamber and characterized by an ejector pump in direct communication with the cryopump through a valve for removing gas from the cryopump during regeneration, and by a source of pressurized, substantially inert gas in communication with the ejector pump for use as the actuating fluid in the ejector pump."

II. A notice of opposition was filed against the patent requesting the revocation of the patent on the grounds of lack of inventive step.
The opposition was based on five documents:

D1: US-A-3 474 953
D2: US-A-3 630 051
D3: US-A-4 438 632
D4: Article in "Solid State Technology", Vol. 25 (1982),title: Regeneration of High-Vacuum Cryopumps"

D5: JP-A-57-146 072.

III. The Opposition Division rejected the opposition by a decision dispatched on 18 May 1992 which stated that the subject-matter of all claims involved an inventive step.

IV. On 8 July 1992 an appeal was filed against this decision, the appeal fee was paid simultaneously. A Statement of Grounds of Appeal was filed on 18 September 1992.

In the Statement of Grounds of Appeal the Appellant (Opponent), although stating in general terms that the subject-matter of all claims did not involve an inventive step and referring in support of this argument to reasons brought forward during the opposition proceedings, merely explicitly argued that the subject-matter of Claim 1 lacked an inventive step over the combination of the knowledge of the person skilled in the art with the teaching of document D5.

V. With the letter of 12 January 1993 the Respondent (Proprietor) filed a translation of the Japanese document D5 into English (D5') and explained why, in the Respondent's opinion, the Appellant's interpretation of the document D5 was wrong.

VI. The Appellant requests revocation of the patent. The letter dated 22 January 1993 contained an auxiliary request for oral proceedings which request was however withdrawn with the letter dated 16 July 1993 following a communication from the Board.

The Respondent requests the rejection of the appeal and auxiliarily oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. Since, according to the established jurisprudence of the Boards of Appeal, a mere reference in the Statement of Grounds of Appeal to what was argued by the Appellant in the opposition proceedings does not comply with the requirement of the last sentence of Article 108 EPC, the present Statement of Grounds only relates to those arguments which are brought with respect to the subject-matter of Claim 1 and which are based on document D5 as well as on the general technical knowledge of a person skilled in the art.

3. Novelty is not disputed

4. The Japanese document D5 (see Figure 1 and the translation D5', line 9 of page 3 to line 2 of page 4) discloses an apparatus for regenerating a cryopump with a valve for introducing hot gaseous nitrogen into the cryopump and a vent valve for blowing out this gas. Once the cryopanel has returned to an ordinary temperature the introduction and vent valves are closed. Then the inside of the cryopump is evacuated with a rotary pump.

5. The method according to Claim 1 differs from the prior art teaching in that:

   (i) the evacuation of the gases takes place simultaneously with the warming;
   (ii) an ejector pump is used to evacuate the evaporated gases; and
   (iii) this pump is actuated by a substantially inert fluid.

5.1 Concerning feature (i), the following additional remark has to be made:

In the pump according to documents D5 -D5' the valve 5 only opens once the pressure inside the pump reaches 1 atmosphere (see D5': page 3, lines 21 to 24) so that the evaporated gases only begin to be evacuated once the pressure has been raised to 1 atmosphere.

Although it could be said that after the inside pressure has attained 1 atmosphere, then the evacuation of still vaporising gases takes place simultaneously with the evaporation or release, it is clear to a person skilled in the art that in the present case the word "simultaneously" used in Claim 1 has to be interpreted in the light of the description, i.e. that the warming and the evacuation start simultaneously, that means before the pressure of 1 atmosphere has been reached.

Indeed the opposed patent, in column 3, line 62 to column 4, line 24 for example, clearly sets out how a prior art system operates (column 3, line 62 to column 4, line 20) and how the invention modifies this functioning (column 4, lines 21 to 24): "gas which is released from the cryopump during regeneration is removed rapidly from the system through a valve 68 by means of an ejector 70".

In column 4, lines 50 to 54 it is stated that: "by promptly reducing the pressure in the cryopump chamber to about 2 PSIA, the pressure, even with combustion, does not rise above 1 atmosphere".

Moreover, in column 2, lines 34 to 36 it is specified that "gases which evaporate are simultaneously evacuated from the cryopump ...".

All these parts of the description show that the intention of the Applicant when using the word "simultaneously" was to show that the evacuation takes place essentially from the beginning of the evaporation of the gases and not only after the pressure has been increased to 1 atmosphere, as in documents D5-D5':

6. The simultaneous evacuation has the effect that gases evaporating at lower temperatures are withdrawn before gases evaporating at higher temperatures begin to evaporate, which diminishes the risk of combustion if two such gases were likely to combine.

The use of a pump obviously permits the evacuation of the evaporated gases more quickly than without a pump. The use of an ejector pump actuated by a substantially inert gas permits the dilution of the combustible gases and thus permits the reduction of the danger of combustion at the outlet.

The objective problem, therefore, may be seen to be the reduction of the danger of combustion during evacuation or more generally during regeneration of the pump.

7. *Inventive step*

The problem is to reduce the danger of combustion during the regeneration of the pump.

This problem in itself cannot be considered to be inventive since it is a general concern of the skilled person in this field to avoid the combustion of the evaporated gases, such a combustion having detrimental effects in the cryopump in particular due to the rise in pressure.

The skilled person wanting to solve this problem may have had two thoughts, first to dilute the dangerous gases and secondly to evacuate the gases more quickly so that they mix with atmospheric air.

The state of the art teaches the skilled person to dilute the gases by introducing the inert gas into the cryopump so that the gases which evaporate immediately are diluted, before being evacuated as a mixture of inert and non-inert gases. None of the prior art documents suggests the use of an inert gas at the evacuation port of the cryopump.

Concerning the second point, no prior art device is equipped with a pump at the exhaust valve of the evaporated gases, and even in the cases where the inside of the cryopump is connected to a pump, this pump is only used to diminish the pressure inside the cryopump in order to be able to start it again, and this pumping is done only once the evaporation process is at an end or almost at an end.

The reason for this is that the skilled person fears backstreaming of oil from mechanical pumps which would contaminate the absorbent and he would not therefore be inclined to use a pumping means at the evacuation port of the cryopump.

The use of an ejector pump is not suggested by the prior art, since no prior art cryopump is provided with such a pump.

The use of an ejector pump actuated by a substantially inert gas has the advantageous effect of combining the quick evacuation of the gases, due to the pumping, with the dilution of the evaporated gases by the inert gas used and avoids at the same time any risk of

contamination of the adsorbent due to backstreaming of oil.

Although this use has particular advantages, none of the prior art devices is provided with such a pump.

This particular advantageous combination would itself justify the recognition of an inventive step. The addition of feature (i) that the evacuation of the gases is simultaneous with the warming is not suggested by the prior art either, since in the prior art devices the evacuation only takes place once the inside pressure has risen above 1 atmosphere.

With the features specified in Claim 1 it is possible to maintain the pressure inside the cryopump at a particularly low level while the evaporated gases are evacuated, and thereby to diminish the danger of combustion.

Even in the event of combustion the pressure inside the cryopump would not rise to a dangerous level.

The subject-matter of Claim 1 therefore involves an inventive step in the meaning of Article 56 EPC and is patentable within the meaning of Article 52 EPC. The reasons for the presence of an inventive step in the method of Claim 1 apply analogously to the vacuum system of Claim 6 for performing said method. Claims 2 to 5 and Claim 7 are dependent on Claims 1 and 6 respectively and are therefore also patentable.

7. The Proprietor's main request being allowable, it is not necessary to appoint oral proceedings in accordance with his auxiliary request.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin C. Andries