

Veröffentlichung im Amtsblatt	Ja/Nein
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non

Aktenzeichen / Case Number / N^o du recours : T 550/89 - 3.2.4

Anmeldenummer / Filing No / N^o de la demande : 84 103 732.8

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 126 909

Bezeichnung der Erfindung: Cryopump with rapid cooldown and increased pressure
Title of invention: stability
Titre de l'invention :

Klassifikation / Classification / Classement : F04B 37/08

ENTSCHEIDUNG / DECISION
vom / of / du 23 July 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Helix Technology Corporation

Einsprechender / Opponent / Opposant : Leybold AG

Stichwort / Headword / Référence : Cryopump

EPÜ / EPC / CBE Art. 56, 114(2)

Schlagwort / Keyword / Mot clé : "Alleged prior use neither unequivocally
presented nor proven and brought forward too
late"

Leitsatz / Headnote / Sommaire



Case Number : T 550/89 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 23 July 1990

Appellant : Leybold AG
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Representative : J. Leineweber, Dipl.-Phys.
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Respondent : Helix Technology Corporation
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Representative : J. Spies
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Decision under appeal : Decision of Opposition Division of the European
Patent Office dated 26 June 1989 rejecting
the opposition filed against European patent
No. 0 126 909 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : C. Andries
Members : H. Seidenschwarz
O. Bossung

Summary of Facts and Submissions

- I. European patent No. 0 126 909 comprising 8 claims was granted to the Respondent (proprietor of the patent) on 22 July 1987 in response to European patent application No. 84 103 732.8 filed on 4 April 1984.

The independent Claims 1 and 7 read as follows:

Claim 1:

"A cryopump having at least two refrigerator stages (29,32) comprising a passive heat load to the first stage (29), the first stage (29) being held at a temperature above about 50 K, the heat load being less at initial first stage temperatures, wherein the passive heat load is due to radiant heat flow resulting from a radiation shield (44), characterized in that the outer surface of the radiation shield (44) is blackened."

Claim 7:

"A method of preventing crossover hang up in a cryopump having at least two refrigerator stages (29,32) comprising providing a passive heat load to the first stage (29), the first stage (29) being held at a temperature above about 50 K, the heat load being less at initial first stage temperatures, wherein the passive heat load is due to radiant heat flow resulting from a radiation shield (44) characterized by blackening the outer surface of the radiation shield (44)."

- II. The Appellant (opponent) filed an opposition against the European patent and requested the revocation of the patent in its entirety, on the grounds that the subject-matter of Claim 1 was not patentable according to Articles 52 to 57 EPC, mainly in the light of document D1 and of the common knowledge of a skilled person.

D1: SEMICONDUCTOR INTERNATIONAL, October 1982.
P.H. Singer "Update on Cryogenic Pumps", pages 89 to 99.

The Appellant's submissions related to lack of inventive step of, among others, the independent Claims 1 and 7.

III. By its Decision dated 26 June 1989, the Opposition Division rejected the opposition.

IV. On 24 August 1989 the Appellant filed a notice of appeal by telex confirmed by letter received on 26 August 1989. The prescribed fee was paid on 24 August 1989. The statement of grounds was submitted on 27 October 1989.

The Appellant also raised in the statement of grounds the objection of lack of novelty of the subject-matter of the patent. The objection was based on the alleged prior use of the patented subject-matter.

With a letter dated 17 January 1990 the Appellant further substantiated the alleged prior use by filing a statutory declaration ("Eidesstattliche Versicherung") of Prof. Dr. H.-H. Klein (document D2) with three annexes, namely

D3: "Projekt-Statusbericht", 04.11.1982, VT51-
Dr. Kl/BG;

D4: "Besuchsbericht", 04.03.1983, VT51-Dr. Kl/rf; and

D5: J.Vac.Sci.Technol. A, Vol. 2, No. 2, Apr.-June 1984,
American Vacuum Society, H.-H. Klein and R. Heisig
"Use of refrigerator-cooled cryopumps in sputtering
plants", pages 187-190.

V. The Respondent contested the arguments brought forward by the Appellant and stated that the late filed documents

should be considered as belated submissions of facts and evidence in the sense of Article 114(2) EPC.

- VI. The Appellant implicitly requests to set aside the decision under appeal and to revoke the patent in its entirety.

The Respondent requests to reject the appeal.

Reasons for the Decision

1. The appeal is admissible.
2. With respect to the alleged public prior use presented for the first time during the appeal procedure the following can be stated:
 - 2.1 Document D2 filed by the Appellant only together with his statement of grounds of appeal (27 October 1989), as well as documents D3 to D5 filed even later (letter dated 17 January 1990), were not submitted in due time within the meaning of Article 114(2) EPC.

Indeed, due to the fact that the Opposition Division maintained the patent in suit unamended and the patent is still unamended during the present appeal, these documents should actually have been filed within the time limit of nine months according to Article 99(1) EPC (i.e. before 5 September 1985).
 - 2.2 The examination by the Board of these documents D2 to D5 furthermore revealed only submissions which did not prove unequivocally the inside knowledge within the Appellant's firm, on the one hand, and the alleged prior use in the

American firm, on the other hand, to be without any doubt available to the public.

- 2.3 Furthermore, the Appellant should bring forward his arguments not only as soon as possible, but also in a complete form with proven submissions, particularly when he is already too late (cf. above point 2.1). If he does not do so, it is not reasonable to burden the Respondent with new grounds and with new additional submissions.

The Board therefore is of the opinion that the Appellant, although too late, had ample opportunity to substantiate his case in a convincing manner, but that as a result of poorly presented and unproven submissions he could not convince the Board of the relevance of these alleged submissions. Mere assertions are not sufficient.

- 2.4 Therefore, the newly cited ground (lack of novelty) in combination with the newly cited documents (D2 to D5) are disregarded in accordance with Article 114(2) EPC.

3. Novelty

After examination of the documents cited in the search report and during the opposition proceedings, the Board is satisfied that none of them discloses a cryopump or a method of preventing cross-over hang up in a cryopump having all the features as defined in Claims 1 or 7 respectively, particularly the blackened outer surface of the radiation shield in the meaning of these claims. Since this has never been disputed with respect to the documents cited in the search report and during the opposition proceedings, there is no need for further detailed substantiation of this matter.

Therefore, the subject-matter as set forth in Claims 1 or 7 is to be considered novel within the meaning of Article 54 EPC.

4. Closest state of the art

4.1 According to the Board, the closest state of the art as defined in the pre-characterising portions of Claims 1 or 7 respectively is the commonly known, conventional cryopump and the corresponding method of preventing crossover hang up in a cryopump, as disclosed not only in the description of the patent in suit (column 2, lines 43 to 52), but also in document D1 (page 92:A user problem).

Indeed, according to these disclosures the crossover hang up problem was not only known but solutions were already given.

4.2 Although the fact that document GB-A-2 061 391 (D6) discloses that the first pumping stage is maintained at a temperature in the order of 50°K to 80°K, which is a temperature range avoiding crossover hang up, if that temperature is really maintained at such temperature during functioning, the Board does not consider this document as representing the closest state of the art, since the crossover hang up as well as the method or manner to maintain that temperature are neither indicated nor suggested in this document.

5. Problem and solution

5.1 A problem experienced by certain users of cryopump systems is known as crossover "hang up" (cf. document D1: page 92:A user problem; patent in suit: column 1, line 65 to column 2, line 52), and is due to the condensing of low

boiling gases already on the first stage surfaces, which results in an undesirable high partial pressure of argon at that first stage temperature.

It was already known, according to the patent in suit, to solve that problem by making the first stage arrays warmer by introducing an electrical heat load onto that first stage to prevent excessive cooling of that stage.

According to the Respondent a load on the stage generally increases cooldown time of the refrigerator. Minimizing cooldown time, however, is a significant concern in designing cryopump systems.

Furthermore, electrical elements can present a hazard where the concentration of hydrogen is high.

Another problem associated with cryopump systems is that a pulsed thermal load can result in erratic pressure in the work chamber.

- 5.2 The technical problem to be solved therefore consists in providing a cryopump or a method of preventing crossover hang up in a cryopump which avoids the above difficulties in overcoming crossover hang up and which permits to obtain a stable work chamber pressure.
- 5.3 The problem is solved by the features mentioned in Claims 1 and 7 respectively, more particularly by the blackening of the outer surface of the first stage radiation shield, which provides a passive heat load to the first stage to ensure that the first stage is held at a temperature above about 50°K. Furthermore, during initial stages of cooldown, the passive heat load is substantially less than that at the final cooldown

temperature condition, so that cooldown time is not substantially affected.

6. Inventive step

6.1 Document D1 not only describes the crossover "hang up" problem, but suggests also solutions to solve it (page 92, right hand column), namely by making the first stage less efficient in such a manner that argon will initially directly be pumped onto the second stage. This can be obtained either by introducing a heat load onto the first stage or by mechanically insulating it.

6.1.1 According to the Board, the first solution suggests to a skilled person before the priority date of the patent in suit an active action particularly since the word "introducing" has been used and since it was already commonly known, according to the Respondent and as indicated already in the originally filed description to make the first stage arrays warmer by introducing an electrical heat load onto that stage.

Furthermore, due to the fact that the outer surface of the radiation shield is traditionally polished to avoid loading of the first stage, it would have been the normal attitude for a skilled person to clearly indicate that contrary to the normal practice of polishing the outer surface, a passive heat load was intended to be permitted on that surface. The fact that such an important indication, making clear that what is normally done has been modified, is lacking, suggests that a passive heat load as defined in Claims 1 and 7 of the patent in suit cannot have been intended by the disclosure of the above-mentioned first solution.

Therefore, the Board is of the opinion that the first solution suggests to a skilled person only the same solution as revealed as common knowledge in the patent in suit (an active -electrical - heat load).

The Board agrees with the Respondent and the Opposition Division when they state that a cryopump designer must be concerned with more than just loading of the first stage when very low temperatures occur and when argon hang up is a problem. The designer must also be concerned with circumstances in which the overall load to the system would be high and in which any non-controlled additional loading would be undesirable. In particular, during pumpdown of a cryopump, thermal load must be minimized. A skilled person would therefore be rather reluctant to provide for a non-controllable passive heat load.

- 6.1.2 The second solution (mechanically insulating the first stage) does not suggest the solution as claimed in the patent in suit.
- 6.1.3 The Board is therefore of the opinion that document D1 neither indicates nor suggests the use of an increased passive heat load to solve the problem, let alone the use of a blackened outer surface of the radiation shield.
- 6.2 Neither of the documents (D6 and US-A-4 356 701) cited in the search report indicates or suggests to blacken the outer surface of the radiation shield. They are involved with other problems to be solved, and do not disclose the essential feature needed to solve the problem of the patent in suit.

Therefore a skilled person cannot be guided by these documents towards the claimed solution.

6.3 To sum up it can be said that none of the cited documents, even in combination with each other, suggests to a skilled person the solution outlined by the features of Claims 1 and 7.

Therefore, the subject-matter of Claims 1 and 7 involves an inventive step within the meaning of Article 56 EPC.

7. Since Claims 1 and 7 are allowable, the dependent Claims 2 to 6 and 8, which relate to further particular embodiments of the invention, are also allowable.

Order

For these reasons, it is decided that:

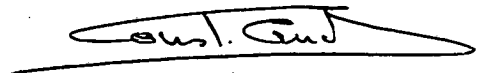
The appeal is dismissed.

The Registrar:



N. Maslin

The Chairman:



C. Andries