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D E C I S I O N
of 17 June 1997

Case Number: T 0984/94 - 3.3.2

Application Number: 89900862.7

Publication Number: 0344290

IPC: B01J 3/00

Language of the proceedings: EN

Title of invention:
Vacuum apparatus

Patentee:
The BOC Group plc

Opponents:
Leybold Aktiengesellschaft
Pfeiffer Vacuum GmbH

Headword:
Vacuum apparatus/BOC

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
T 0513/90

Catchword:
-



Case Number: T 0984/94 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 17 June 1997

Appellant: Leybold Aktiengesellschaft
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Other party: Pfeiffer Vacuum GmbH
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Representative: -

Respondent: The BOC Group plc
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Representative: Bousfield, Roger James
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 10 November 1994
rejecting the opposition filed against European
patent No. 0 344 290 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: F. Antony
Members: G. J. Wassenaar
R. E. Teschemacher

Summary of Facts and Submissions

I. European patent No. 0 344 290 was granted with 10 claims in response to European patent application No. 89 900 862.7, filed on 14 December 1988. The mention of the grant was published in European Patent Bulletin 92/42 of 14 October 1992.

Granted Claim 1 reads as follows:

"The use of a plastic material comprising a liquid crystal polymer as a component exposed in use to a high vacuum of 1.332×10^{-4} mbar (10^{-4} tor) or less."

II. Notices of Opposition were filed against the European patent by the Appellant (Opponent 01) on 5 July 1993 and the party as of right (Opponent 02) on 9 July 1993. Revocation of the patent was requested on the grounds of lack of inventive step (Articles 56 and 100(a)EPC).

The oppositions were supported, inter alia, by the following document:

Wutz et al, "Theorie und Praxis der Vakuumtechnik", 2nd Ed. 1981, pages 449 to 450 (D2).

III. With its decision dated 10 November 1994, the Opposition Division rejected the oppositions. It held that the problem underlying the invention was to find a plastic material for vacuum apparatus which outgasses substantially less than other plastics. The claimed solution, i.e. the use of a liquid crystal polymer, was considered to involve an inventive step. It was stated that such polymers were known at least since 1965 but were never used or suggested for the claimed purpose. Neither was it known that liquid crystal polymers had very low outgassing rates. The selection of this

specific class of polymers was therefore considered to be "more than just simple routine work of an ordinarily skilled worker". In the contested decision reference was also made to the following document which was not mentioned in the notices of opposition but had been considered during examination of the application on which the patent was based, i.e.:

Gummi Fasern Kunststoffe, volume 39, no. 12, December 1986, pages 665, 668; hereinafter referred to as D5.

IV. An appeal against that decision was lodged by the Opponent 01 (Appellant) on 23 December 1994, and the appeal fee was paid at the same time. With the statement of the grounds of appeal, which was filed on 9 March 1995, the Appellant submitted copies of pages 280 and 281 of the book "Werkstoffe der Hochvakuumtechnik" of Dr. Werner Espe (1961), referred to as D4, which disclosed that polytetrafluorethylene (PTFE) with the trade name Hostaflon (TM) had an outgassing of 2 to 6×10^{-3} Torr/cm².s after 3 hours pumping. These values were said to show, that the outgassing rates of polymers already used in high vacuum apparatus was of the same order of magnitude as that of the polymers used according to the patent-in-suit. It was argued that, since it was known to use such plastics in high vacuum technics, it was obvious to use other known polymers, such as liquid crystal polymers, for the same purpose. During oral proceedings, which were held on 17 June 1997, further reference was made to D5 pointing out that the properties of the liquid crystal polymers disclosed therein, such as high melting temperature and stability against both, high and low temperatures, made them suitable candidates for high vacuum application. It was acknowledged that D5 did not disclose the respective outgassing rate, but it was argued that it was obvious to test this property. The finding that the outgassing

rate was better than that of polymers known to be used under high vacuum conditions was not surprising. With reference to decision T 513/90 (OJ EPO, 1994, 154) it was concluded that the selection of readily available materials for a specific purpose did not involve an inventive step.

V. The Respondent counterargued that the test results disclosed in D4 could not be compared with those of the Table in the present specification because of different testing conditions applied. He filed a graph showing the outgassing rates at different temperatures of CX2, corresponding to VECTRA 625, a liquid crystal polymer according to the patent in suit, and of PTFE. It was concluded that the polymers according to the invention had much lower outgassing rates than PTFE, which supported presence of an inventive step. With respect to the Appellant's arguments based on D5, it was emphasised that the physical properties disclosed therein did not provide any indication that the respective liquid crystal polymer had a low outgassing rate. It was further stressed that there existed a prejudice against the use of plastics under high vacuum conditions because of their unsatisfactory outgassing rates. The fact that, although liquid crystal polymers were known since 1965, they had never been used in high vacuum technology, gave evidence to this prejudice.

VI. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

The party as of right was not present during oral proceedings and did not submit any request in writing.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. The subject matter of the claims is new. Novelty was, in fact, not disputed.
3. *Inventive step*
 - 3.1 The Board regards D2 as the closest prior art. This document, a textbook relating to vacuum technology, discloses the use of certain plastics in vacuum. The only plastics mentioned therein as suitable under high vacuum conditions are polychlorobutadiene, vinylidene fluoride-hexafluoropropylene-copolymers and PTFE; these plastics are all elastomers. The only thermoplast mentioned in D2 is polyvinyl chloride (PVC), which is said to be suitable for making flexible connections under moderate vacuum conditions (Table 13.3).
 - 3.2 The decisive parameter for the use of a material under high vacuum conditions is its outgassing rate. In order to be suitable under high vacuum conditions, the outgassing rate must be extremely low. Starting from D2, the problem underlying the invention can therefore be regarded as selecting a plastic material suitable for components exposed in use to a high vacuum and, for that purpose, having a lower outgassing rate. According to Claim 1 this problem is to be solved by the use of a plastic material comprising a liquid crystal polymer. (A high vacuum as defined in Claim 1 is a vacuum of 1.332×10^{-4} mbar "or less", which can only mean a vacuum with a **gas pressure** of 1.332×10^{-4} mbar or less (see description, page 2, lines 5 and 6). Any other interpretation of the claim language would be technically senseless.)

- 3.3 D2 as such does not disclose any outgassing rates of the plastic materials to which it refers, but such rates are disclosed in D4. This document reveals that, among the materials mentioned, Hostaflon(TM) has the lowest outgassing rate, the disclosed range being of the same order of magnitude as that given in the patent in suit for liquid crystal polymers; compare Table T16-11A of D4 with the table in the patent in suit.

According to the Respondent this is not a valid comparison because the results of the two tables were obtained using different operating conditions. In an experimental report filed by the Respondent in response to the grounds of appeal, the outgassing rates of VECTRA 625, a liquid crystal polymer according to Claim 1, were compared with those of PTFE under equal conditions. At temperatures between about 24 and 30°C the outgassing rate of the product of the patent in suit was lower than that of PTFE by about a factor of 5. Since the Appellant has not challenged these comparative data, the Board is satisfied that the use of the product of Claim 1 actually solves the above-mentioned problem.

- 3.4 It remains to be decided whether the claimed solution was obvious to a person skilled in the art.

Neither D2 nor D4 - documents relating to high vacuum technique - contain any reference to liquid crystal polymers. The only document before the Board disclosing liquid crystal polymers is D5, an article in a periodical relating to plastics highlighting their high tensile strength and also mentioning their high melting temperature (250-400°C), high application temperature (185-250°C) and excellent behaviour at low temperatures. There is, however, no disclosure of their outgassing rates, nor any other pointer to their possible use under high vacuum conditions. The Board

cannot accept the Appellant's argument that it was obvious to test available plastics for use under high vacuum conditions, and that especially the above-mentioned physical properties of liquid crystal polymers disclosed in D5, would have led the skilled person to these materials. The allegation that the above-mentioned physical properties were an indication that the liquid crystal polymers would have very low outgassing rates was in no way substantiated. It remains obscure on what basis the skilled person could have derived the expectation of a low outgassing rate from the said physical properties. Since each of those plastics disclosed in D2 as suitable for use in a high vacuum apparatus belongs to a completely different class of plastic materials, the selection for the claimed use of the relatively small group of liquid crystal polymers over numerous other groups of plastic materials must, in the absence of any specific pointer, be considered to involve an inventive step.

Just as an aside, the Board would have arrived at the same conclusion if, in the absence of the experimental report referred to in point 3.3 above, it would have considered that the actual solved problem was just provision, for the claimed use, of materials having outgassing rates equally low as, but not lower than Hostaflon(TM).

- 3.5 Decision T 513/90, referred to by the Appellant, does not lead the Board to any different conclusion. According to that decision, a particular use of a material should not be regarded as inventive if the said material is "generally available on the market and suitable for the purpose" and if the skilled person would be "highly likely to use it for reasons irrespective of its characteristics" (third paragraph of point 4.4). The second quoted proviso is not met in the present case, because the Board cannot see any

reason why the skilled person should have been "highly likely", for any reason whatsoever, to use liquid crystal polymers in contradistinction to other plastic polymers. In particular, such a reason cannot be derived from the physical properties referred to in point 3.4 above, since numerous plastic materials have similar properties and there is no guidance for the person skilled in the art which one should be tested for their outgassing rate.

3.6 The other documents on file, not mentioned above, do not provide any hint for the claimed solution of the existing technical problem either. Since they were not discussed in the appeal proceedings, it is not necessary to consider them in more detail in this decision. It follows from the foregoing considerations that the subject matter of Claim 1 is not only new, but also involves an inventive step within the meaning of Article 56 EPC. The same applies to the subject matter of Claims 2 to 10, which, being dependent upon Claim 1, include all the features of Claim 1.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:



P. Marcorana

The Chairman:



F. Antony

