BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File No.: T 1028/92 - 3.4.2

Application No.: 87 116 173.3

Publication No.: 0 266 745

Classification: B01D 53/22, B01D 53/04

Title of invention: Process for separating components of a gas stream

D E C I S I O N
of 3 May 1993

Applicant: Air Products and Chemicals, Inc.

Proprietor of the patent: -

Opponent: -

Headword: -

EPC: Art. 54(3), (4)

Keyword: "Novelty (yes)" - "Case remitted to the Examining Division for further prosecution"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1028/92 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 3 May 1993

Appellant: Air Products and Chemicals Inc.
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Representative: Schwabe, Sandmair, Marx
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Decision under appeal: **Decision of the Examining Division 2.1.13.030 of the European Patent Office dated 3 July 1992 refusing European patent application No. 87 116 173.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: C. Black
L.C. Mancini

Summary of Facts and Submissions

I. European patent application No. 87 116 173.3 (publication No. 0 266 745) was refused by decision of the Examining Division.

II. The reason of the refusal was that the earlier European application

(D1) EP-A-0 241 313,

comprised in the state of the art relevant to the application in suit pursuant to Article 54(3) and (4) EPC, was prejudicial to the novelty of the subject-matter of Claims 1 to 6.

III. The Applicant (Appellant) lodged an appeal against this decision.

IV. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of following documents:

Main request:

- Claims: No. 1 to 6 received on 14 November 1991 with letter of 14 November 1991,
- description: pages 1 to 24 as originally filed,
- drawings: sheets 1/2, 2/2 as originally filed,

first auxiliary request:

- Claim: No. 1 received on 3 November 1992 with letter of 3 November 1992,
- Claims: No. 2 to 6 according to the main request,
- description: pages 1 to 24 as originally filed,
- drawings: sheets 1/2, 2/2 as originally filed,

- Claim: No. 1 received on 3 November 1992 with letter of 3 November 1992,
- Claims: No. 2 to 6 according to the main request,
- description: pages 1 to 24 as originally filed,
- drawings: sheets 1/2, 2/2 as originally filed,

The Appellant further requested, auxiliarily:

- to replace in step (e) of Claim 1 of the main request the expression "desired component" by the expression "recovered desired component", and
- oral proceedings.

V. Independent Claim 1 according to the Appellant's main request reads as follows:

"A process for recovering a desired component from a multi-component feed gas stream, said process comprising:

(a) passing said feed gas stream (10) to a plurality of membrane separation units (21, 229) to produce a stream concentrated in the desired component;

(b) passing said concentrated stream (30) to an adsorption unit (23) containing an adsorbent that selectively adsorbs non-desired gaseous components present in said stream to produce a product stream further concentrated in the desired component;

(c) desorbing the gaseous components from said adsorbent;

(d) recycling said desorbed gaseous components to the feed gas stream entering the membrane separation units (21, 220); and

(e) rinsing said adsorption unit with a portion of the desired component after the adsorbed components are desorbed.".

Independent **Claim 1** according to the Appellant's **first auxiliary request** differs from Claim 1 of the main request in that reference signs have been deleted and step (e) reads as follows:

"(e) rinsing said adsorption unit after the adsorbed components are desorbed with a portion of the desired component not containing the void space gas released from the product end of an adsorption bed of the adsorption unit upon a cocurrent depressurization of said bed".

Independent **Claim 1** according to the Appellant's **second auxiliary request** differs from Claim 1 of the main request in that reference signs have been deleted, step (e) has also been deleted and steps (a) and (d) read as follows:

"(a) passing said feed gas stream to a plurality of membrane separation units to produce a stream concentrated in the desired component, which plurality of membrane separation units comprises a first membrane separation unit and a second membrane separation unit;",

and

"(d) combining the permeate stream of the second membrane separation unit with said desorbed gaseous components prior to being recycled to the feed gas stream entering the first membrane separation unit".

According to all the requests, **Claims 2 to 6** depend on Claim 1.

VI. In support of the allowability of his requests, the Appellant submitted essentially the following arguments.

As to the main and first auxiliary request, contrary to the opinion of the first instance, the "void space gas" mentioned in Claims 16, 17 of D1 could not be the "portion of the desired component" as referred to in step (e) of Claim 1 of the application in suit. D1 taught to purge an adsorption bed with the void space gas of another adsorption bed, whereby this void space gas was released upon the concurrent depressurization of the latter bed. Said void space gas did not leave the adsorption system and could never constitute a part of the recovered component.

With regard to the second auxiliary request, it was taught by D1 to recycle the non-permeate gas from the second stage membrane separator as a feed gas to the first stage membrane separator, which was the very opposite to step (d) of Claim 1.

The Appellant, furthermore, submitted arguments concerning novelty and inventive step of the subject-matter of the claims according to the various requests with respect to other prior art documents which were cited for the first time in the decision to refuse the application.

Reasons for the Decision

1. The appeal is admissible.

2. Article 54(3) and (4) EPC

2.1 Main request

2.1.1 Earlier European application D1 discloses a process for recovering a desired component from a multi-component feed gas stream, said process comprising the following steps:

- passing said feed gas stream to a plurality of membrane separation units to produce a stream concentrated in the desired component (see Claim 1, step (a) and column 8, lines 49 to 58);

- passing said concentrated stream to an adsorption unit containing an adsorbent that selectively adsorbs non-desired gaseous components present in said stream to produce a product stream further concentrated in the desired component (see Claim 1, step (c));

- desorbing the gaseous components from said adsorbent (see Claim 1, step (d));

- recycling said desorbed gaseous components to the feed gas stream entering the membrane separation units (see Claim 1, step (e)); and

- rinsing said adsorption unit (see Claims 16 and 17).

In the process according to D1 the void space gas released from the product end of a bed of the adsorption

unit (see Claim 16) is employed for purging other adsorption beds (see Claim 17), whereas Claim 1 of the main request (see step (e)) requires rinsing the adsorption unit with a portion of the desired component, i.e. the recovered product gas, after the adsorbed components are desorbed. That these two situations are quite different from each other results from the following.

In column 6, lines 32 to 35 of D1 it is stated that in the concurrent depressurization step the void space gas present in a bed of the adsorption unit is released from the product end of the bed. This gas is then passed to another bed at lower pressure for pressure equalization purposes and/or to another bed for purge purposes (see column 6, lines 43 to 49). During the concurrent depressurization, the adsorption front is caused to move further toward the product end of the bed by the additional selective adsorption of the more readily adsorbable component (see column 6, lines 37 to 41).

A regeneration of an adsorption unit is normally made when the breakthrough point is reached, at which time the adsorption front is at the product end of the bed and the exit concentration of the non-desired component begins to rise rapidly towards the inlet concentration in the feed gas stream. If the passage of the gas is further continued, the exit concentration continues to rise until it becomes substantially the same as the inlet concentration. It is thus clear that the argument of the first instance, that "the void space gas leaving the adsorber at the product end has product quality as long as the adsorption front does not move past the product end" (see the decision of 3 July 1992, page 4, end of first paragraph), disregards the above mentioned fact that a regeneration is not necessary until the breakthrough point is reached and, therefore, cannot

support the conclusion that the released void space gas mentioned in Claims 16, 17 of D1 is identical to the "desired component" cited in step (e) of Claim 1 of the main request.

On the contrary, the Appellant's interpretation, that said void space gas of D1 is kept apart from any product in order to serve the adsorption system internal pressure equalization and/or purge purposes, is convincing and supported by Claims 16 and 17 of D1, when read in conjunction with column 6, lines 41 to 52 and column 14, lines 18 to 36. A further support for this conclusion derives from the fact that the void space gas released from the product end of the bed is intended to be the gas present in the bed at the end of the adsorption step (see column 6, lines 33 and 34).

2.1.2 In view of the foregoing, D1 is not considered as comprised in the state of the art pursuant to Article 54(3) and (4) EPC and its content as filed is not prejudicial to the novelty of the subject-matter of Claim 1 of the main request.

2.2 Auxiliary requests

2.2.1 Since the objection under Article 54(3) and (4) EPC is not founded with regard to the main request, the auxiliary requests need not to be considered.

3. Articles 54(1),(2) and 56 EPC

3.1 The decision to refuse the application is based exclusively on the objection under Article 54(3) and (4) EPC mentioned in points II.2 to II.5, this objection having been raised during the examination procedure. On the contrary, the comments mentioned in points II.7.1 to II.7.8 of the decision represent "no basis for and no

subject of the ... decision", as it is explicitly stated under point II.7. Indeed, should this not be the case, Article 113(1) EPC would be contravened, because the objection of lack of inventive step discussed in said points II.7.1 to II.7.8 was raised for the first time in the decision itself. Therefore, the applicant as party to proceedings is not adversely affected by the first instance decision (Article 107 EPC), as regards the objection under Article 56 EPC, because the decision is not based on this ground. For this reason, the objection of lack of inventive step raised in the decision of the Examining Division can be disregarded and the Board does not have to consider any statements referring thereto in order not to deprive the Appellant of one instance.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division for further prosecution.

The Registrar: The Chairman:

P. Martorana E. Turrini