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Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 099 211

Bezeichnung der Erfindung: Process for nitrogen enrichment
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B01D 53/04, C01B 21/04

ENTSCHEIDUNG / DECISION
vom / of / du 25 September 1990

Anmelder / Applicant / Demandeur : The BOC Group plc

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (no)"

Leitsatz / Headnote / Sommaire

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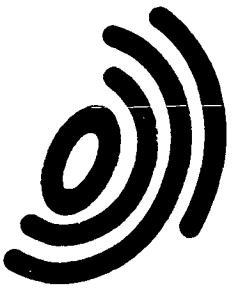

Case Number : T 74/89 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 25 September 1990

Appellant : The BOC Group plc
Hammersmith House
London W69X (GB)

Representative : Wickham, Michael
c/o Patent and Trademark Department
The BOC Group plc
Chertsey Road
Windlesham
Surrey
GU20 6HJ (GB)

Decision under appeal : Decision of Examining Division 031 of the European Patent Office dated 15 September 1988 refusing European patent application No. 83 303 826.8 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : E. Turrini
Members : C. Black
M. Lewenton

Summary of Facts and Submissions

I. European patent application No. 83 303 826.8 (publication No. 0 099 211) was refused by decision of the Examining Division.

II. The reason for the refusal was that the subject-matter of the claims then under consideration, although new, did not involve an inventive step having regard to the disclosure in GB-A-2 073 043 and taking into account the common knowledge of the person skilled in the art.

III. An appeal was lodged against this decision. In the Statement of Grounds for the Appeal, the Appellant (Applicant), in addition to seeking to refute the argumentation of the Examining Division, contended that the Examining Division had acted improperly in refusing the application after having issued only one communication, and that the Board should, therefore, refer the application back to the Examining Division for resumption of the examination proceedings.

IV. In a communication pursuant to Article 110(2) EPC the Board inter alia expressed the provisional opinion that there had been no contravention of the requirements of the EPC by the Examining Division. The Appellant's response, however, contained no clear indication that the objection had been withdrawn, so that it remains to be considered.

V. Accordingly, the Board interprets the Appellant's requests to be as follows:

Main request

The decision under appeal to be set aside and a patent to be granted on the basis of Claims 1 to 7 received 22 January 1988, of which Claim 1 reads as follows:

A process for the separation of a gas mixture comprising the steps of:-

(a) repeatedly performing a cycle of operations in employing a first vessel 16 containing adsorben (sic) which adsorbs one component of a gas mixture more readily than another or the other component of the gas mixture, the cycle of operations comprising:

(i) passing the gaseous mixture under pressure through the vessel 16 whereby said one component is adsorbed and a gas stream relatively lean in the adsorbed component flows out of the bed as product gas;

(ii) regenerating the adsorbent by desorbing gas therefrom and causing a gas stream relatively rich in the desorbed gas to flow out of the vessel 16 to the atmosphere;

(b) repeatedly performing such a cycle of operations employing a second vessel 16' containing said adsorbent, the cycles being phase relative to one another such that at not time is step (i) or step (ii) in one cycle performed simultaneously with the corresponding step in the other cycle;

(c) passing the product gas stream into a reservoir 11; and

(d) at intervals between successive adsorption steps the bottom ends of the two beds are placed in flow communication with each other via a pipe 26;

characterised in that when the process is halted during the intervals between successive adsorption steps when the two beds are placed in flow communication, then gas remaining in the vessels 16, 16' is exhausted to atmosphere from the said vessels countercurrently to the flow of product gas thereby to depressurise the vessels, the beds being exhausted via an exhaust pipe communicating with the pipe 26.

First auxiliary request

The decision under appeal to be set aside and a patent granted on the basis of Claims 1 to 6 received 23 May 1990, of which Claim 1 results from a combination of Claims 1 and 2 according to the main request, and differs from Claim 1 according to the main request in that the wording "and then the vessels are purged with product gas" is added at the end.

Second auxiliary request

The decision under appeal to be set aside and the case remitted to the Examining Division for resumption of the examination proceedings.

VI. The Appellant's argumentation may be summarised as follows:

Main request

When a conventional Pressure Swing Adsorption (PSA) process has to be shut down for any reason, gas desorbs from the

adsorbent during the period of shut-down and on restart finds its way into the product gas. Some time is therefore required before product gas reaches an acceptable purity and this is the problem underlying the claimed process. It is solved by the features of the characterising part of Claim 1. In effect, an additional means of venting adsorbed gas is provided in the form of an exhaust pipe connected to the pressure-equalising line between the bottom ends of the two PSA vessels. The prior art contains no indication of this problem or any suggestion as to how to solve it.

In the conventional PSA process, illustrated by Figure 3 of the patent application in suit without valve 14 and the associated conduit, it is not possible to equalise the pressures in vessels 16, 16' using line 24 without modification because valves 7, 8 cannot be open simultaneously, so that vessels 16, 16' cannot be exhausted simultaneously. The Examining Division, in the first and second paragraphs of Section 3.2 of the decision, is in error in this respect, therefore the whole decision is vitiated.

The decision is also incorrect or inaccurate in the following respects.

In the third paragraph of Section 3.2, the Examining Division acknowledges that the claimed process provides a separate route for exhausting gas, but does not say why this is not inventive and seems not to have understood the applicant's arguments.

The Division, without giving reasons, dismisses as a mere statement the applicant's submission that the experimental results set out in Table 4 of the description are surprising and not predictable from the prior art.

It goes on to say that the characterising part of Claim 1 merely adds an additional and well-known step to a basic adsorption. The said additional step (exhaustion via the pressure equalisation line) was, however, not known prior to the application in suit.

The argumentation in Section 3.1 of the Decision is founded on the Division's assertion that when the vessel is exhausted there are no components present which could be mixed with the product gas, but this is not the case.

First auxiliary request

When the shut-down procedure further includes purging the vessels with product gas, restoration of product purity is almost immediate.

Second auxiliary request

The application was refused after only one communication from the Examining Division, although the Applicant's response raised substantial new issues which should have been dealt with in a further communication. The Division's action was therefore not in accordance with Article 96(2).

Reasons for the Decision

1. The appeal is admissible.

2. Novelty

It is not in dispute that GB-A-2 073 043 discloses all of the features of the prior art portion, but none of the features of characterising portion of Claim 1 according to

the main or first auxiliary request, so that the subject-matter of said claims is novel.

3. Inventive step

3.1 Main request

In the Board's opinion, no contribution to inventivity can be seen in the recognition of the problem summarised in paragraph VI above and set out in greater detail on page 2, first paragraph, of the description of the application in suit. Considering the particular case of separating nitrogen from other constituents of air, it would be normal practice to monitor the composition of the product, as is done using oxygen analyser 18 in the application in suit, to ensure that its purity was sufficient for its intended use. If the oxygen content is too high this will be immediately apparent to the operator.

Moreover, when the oxygen content is high on restart after shut-down, it is within his competence to recognise that the source of the oxygen is oxygen desorbed from the adsorbent during the shut-down since there would seem to be no other source. Faced with this problem there are two options available, either to tolerate the delay until a product of acceptable purity becomes available after restart, or to seek to remove the potentially contaminating oxygen before restart. In the Board's view, the first of these options does not present itself as being so attractive as to deter the person of average skill in the art from investigating the second.

It is not beyond his capacity to appreciate that the oxygen could be removed by desorbing it and exhausting it from the vessels. As is acknowledged in the description, page 2, lines 5 to 7, it is normal for the process to be halted

(closed down) during a pressure equalisation step to make a fresh start-up easier. The pressure equalisation line, therefore, presents itself as the most appropriate place to introduce a means for simultaneous exhaustion of the vessels. Simultaneous exhaustion of the vessels is not possible using line 19 (equivalent to line 34 in GB-A-2 073 043) because the automatically controlled valves 5 and 6 (equivalent to 54, 56 in GB-A-) are only open when the other valves are closed - cf. GB-A-, page 3, lines 18, 19 and 32 to 46. It is, moreover, common sense that exhaustion should be counter-current to the flow of product gas, otherwise contaminating material could remain in the lines downstream from the vessels.

Thus, for the person of average skill in the art faced with the problem underlying the application in suit, all of the features of the characterising portion of Claim 1 are derivable from his common knowledge and their combination with the features of a conventional PSA process does not require inventive ingenuity but only the routine adjustments which are to be expected of him. The Board can, therefore, agree with the conclusion of the Examining Division that the subject-matter of Claim 1 does not involve an inventive step.

The Appellant has put forward certain criticisms of the decision refusing the application, the tenor of some of which is that the validity of the decision is thereby put in question. The Board does not agree that this is so. In Section 3.1 of the decision the Examining Division gives the reasons for its conclusion. When it refers to no components being present, it is not talking about the situation arising when exhaustion is carried out during normal running of the process, but is saying that it is basic knowledge that an exhausted vessel will result in a

purer product, and, therefore, presumably, that it is obvious to exhaust the vessels on shut-down.

The Division then goes on in Section 3.2 to comment on the applicant's response received 22 January 1988, which contains the statement that if it is desired to reduce the pressure to atmospheric level in both vessels during shut-down of the process, this is to be done via the line 19 in the known process. In this respect, the Division would appear to be taking the view that reduction to atmospheric pressure in both vessels is pressure equalisation, and this cannot be said to be incorrect, whatever its pertinence.

It is true that in the following paragraph the Division does not say why it considers the provision of a separate route does not contribute to inventivity; it would seem rather to be stressing that the application documents contained no indication that the invention resided in the provision of a separate route. In this respect, the Board observes that the feature that exhaustion takes place via an exhaust pipe communicating with pipe 26 was not even a feature of a dependent claim in the set originally filed. Apparently, the applicant saw the invention as residing in the idea of exhausting the communicated vessels, and that the means for bringing this about was self-evident and did not require mention as a claim feature.

Further, the Examining Division does not say that the experimental results were a mere statement, but that the applicant's assertion that they were surprising and not predictable from the prior art was a mere statement. An unqualified assertion that experimental results are surprising cannot be accepted as a criterion for patentability, otherwise such a statement could be included automatically in every patent application to guarantee acceptance. In the present case, moreover, it cannot be

surprising that having taken steps to minimise contaminants, product gas of acceptable purity is available sooner after restart.

The reference to a well-known step in the same paragraph is indeed confusing, but either the Division meant an obvious step or it was thinking of the step of exhaustion to atmosphere which inevitably results if the plant has to be dismantled, as suggested in Section 3.1.

In the Board's opinion, therefore, the decision, while it might have benefited from some amplification, should have presented no difficulties to the Appellant in formulating his appeal and contains no false reasoning which if corrected would have led to a different conclusion.

3.2 First auxiliary request

Although the additional feature was only cursorily dealt with in the refusal decision, the Board considers that no useful purpose would be served by remitting the case to the Examining Division for further examination of this aspect, but exercises of its power under Article 111(1) EPC to decide itself on the matter. The Board is of the opinion that it falls within the competence of the average skilled person to purge the exhausted vessels with product gas. This clearly minimises the risk of contaminants re-entering the vessels in the intervening time before re-start. A hint in this direction is derivable from GB-A-2 073 043, page 1, lines 18 to 24, where the advantage of beds initially enriched in product gas (nitrogen) is indicated. Moreover, since as a result the vessels are full of substantially pure product gas, it cannot be surprising that such pure gas is obtained almost immediately after re-start.

3.3 Second auxiliary request

The Appellant's objection that in the examination proceedings he was not invited "as often as necessary" to file observations as required by Article 96(2) EPC has to be investigated particularly with a view to establishing whether Article 113(1) EPC has been contravened. The fact that the decision was issued after only one communication from the Examining Division does not in itself constitute such a contravention - cf. the Decision T 162/82 of Technical Board of Appeal 3.5.1 (OJ EPO, 1987, 533) in particular paragraphs VII, VIII, 9, 12 and 13. The question to be considered is, therefore, whether the decisive objection on which the decision was based remained the same as that set out in the single communication. The amendments in the precharacterising part of Claim 1 in response to said communication merely bring it into correspondence with the disclosure in GB-A-2 073 043, which is an example of the nearest prior art, and provide an antecedent for the amendment made in the characterising part. As regards the amendments in the characterising part, deletion of "any" takes into account the impracticability of exhausting all of the gas, and introduction of "to atmosphere" only specifies what would have been assumed by the reader to be a likely destination of the exhausted gas. Finally, whereas originally Claim 1 only required the gas to be exhausted from the vessels 16, 16', the amended claim adds that exhaustion takes place via an exhaust pipe communicating with the pipe 26. In its single communication the Examining Division found that the claims lack inventive step having regard to the disclosure in GB-A-2 073 043 and the common (or basic) knowledge of the average skilled person. The decision to refuse was based on the same grounds and evidence, and, therefore, there is no contravention of Article 113(1) EPC. The foregoing is consistent with the Decision T 161/82 of the Technical Board of Appeal 3.5.1, paragraph 8 (OJ EPO 1984, 551).

Order

For these reasons, it is decided that

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini