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D E C I S I O N
of 6 March 2002

Case Number: T 0789/00 - 3.3.5

Application Number: 95109363.2

Publication Number: 0739649

IPC: B01D 53/22

Language of the proceedings: EN

Title of invention:

High temperature oxygen production with steam and power generation

Patentee:

AIR PRODUCTS AND CHEMICALS, INC.

Opponent:

Praxair Technology, Inc.

Headword:

Oxygen/AIR PRODUCTS

Relevant legal provisions:

EPC Art. 54(1)

Keyword:

"Novelty - no"

Decisions cited:

-

Catchword:

-



Case Number: T 0789/00 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 6 March 2002

Appellant: Praxair Technology, Inc.
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Respondent: AIR PRODUCTS AND CHEMICALS, INC.
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 23 May 2000
concerning maintenance of European patent
No. 0 739 649 in amended form.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
J. H. Van Moer

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division to maintain European patent No. 0 739 649 in amended form. Amended claim 1 reads as follows:

"A process for recovering oxygen from uncompressed air comprising the steps of:

(a) compressing and heating said air;

(b) passing the resulting compressed and heated air of step (a) into a membrane separation zone comprising one or more oxygen-selective ion transport membranes, and withdrawing therefrom a hot high-purity oxygen permeate stream and a hot oxygen-containing non-permeate stream;

(c) introducing water into said hot oxygen-containing non-permeate stream;

(d) heating the resulting non-permeate stream of step (c); and

(e) passing the heated non-permeate stream of step (d) through an expansion turbine to generate shaft power and withdrawing therefrom a turbine exhaust stream;

wherein the operating temperatures of said membrane separation zone and said expansion turbine are independently maintained by controlling one or more of the variables selected from the group consisting of the rate of heat addition in step (a), the rate of heat addition in step (d), and the rate of water introduction in step (c), whereby said membrane separation zone and said expansion turbine are

thermally delinked for maximum efficiency in recovering said oxygen."

II. In the decision under appeal novelty was discussed on the basis of

D13: EP-A-0 658 366.

The subject-matter of amended claim 1 was considered to be novel because D13 would require that the compressed air was only partly passed to the membrane separator, whereas claim 1 required that all the compressed air was first passed through the membrane separator.

III. In the statement of the grounds of appeal, the appellant(opponent) maintained the novelty objection. Further objections under Articles 84 and 123(2) EPC were raised against the amendments.

IV. With a letter dated 1 March 2002 the respondent filed two sets of amended claims as main request and first auxiliary request. During oral proceedings, which took place on 6 March 2002, the respondent made the earlier first auxiliary request to its main request and submitted three further auxiliary requests. In the new requests the first lines of claim 1 were amended as follows, the rest remaining unchanged:

Main request:

"A process for recovering oxygen from air at atmospheric pressure comprising the steps of:

(a) compressing and heating said air;

(b) passing the resulting compressed and heated air of step (a) into a membrane separation zone..."

First auxiliary request:

"A process for treating one air stream at atmospheric pressure from which oxygen is recovered comprising the steps of:

(a) compressing and heating said air stream;

(b) passing the resulting compressed and heated air stream of step (a) into a membrane separation zone..."

Second auxiliary request:

"A process for treating one air stream at atmospheric pressure whereby oxygen is recovered comprising the steps of:

(a) compressing and heating said air stream;

(b) passing the resulting compressed and heated air stream of step (a) into a membrane separation zone..."

Third auxiliary request:

"A process for recovering oxygen from one air stream at atmospheric pressure comprising the steps of:

(a) compressing and heating said air stream;

(b) passing the resulting compressed and heated air stream of step (a) into a membrane separation zone..."

- V. The appellant (opponent) maintained the novelty objection and raised objections under Articles 84 and 123(2) EPC to the amendments. The respondent's new requests were also considered to be inadmissible because of their late filing.

The appellant's arguments with respect to lack of novelty may be summarized as follows:

In the process according to D13 oxygen was recovered from a compressed and heated air stream in a membrane separation zone, whereby the non-permeate stream, after the addition of water was further heated and passed through an expansion turbine to generate shaft power. Nothing else was required by claim 1 according to any of the requests on file. The fact that according to D13 a further air stream was compressed, which was not passed to the membrane separator but directly to the heater for the expansion turbine could not render the claims of the patent in suit novel.

- VI. The respondent (proprietor) refuted the appellant's objections. The respondent's arguments with respect to novelty may be summarized as follows:

According to present claims 1 the compressed air was in its entirety passed to the membrane separator and only the non-permeate stream was passed after heating to the expansion turbine, whereas according to D13 the compressed air was divided into two streams, whereby only a side stream ("borrowed" stream), which made up at most 20% of the compressed stream, was passed to the membrane separator and whereby the main stream was directly passed after heating to the expansion turbine.

VII. The appellant requested that the decision under appeal be set aside and that the European patent No. 739 649 be revoked.

The respondent requested that the patent be maintained on the basis of the claims submitted as first auxiliary request with the letter dated 1 March 2002 (main request) or, in the alternative, on the basis of the claims submitted at the oral proceedings as auxiliary requests I to III.

Reasons for the Decision

1. *Late requests*

The admissibility of the respondent's requests, presented shortly before and during the oral proceedings, was put in question for being late. In the present case no time limit for presenting further requests has been set (Rule 71a EPC) so that lateness as such cannot be a ground for rejecting these requests. In the Board's opinion only requests which radically change the legal or factual framework of the case, for which the other party cannot reasonably be prepared, might be refused. This is not the case here. The amendments in the new claims are minor and must be regarded as an attempt to overcome a novelty objection. If during oral proceedings the patentee must fear that his earlier arguments and amendments to overcome an objection which would jeopardize his patent might not be sufficient, it should be the normal procedure to give the patentee a final opportunity to save his case by amending his claims. In the Board's judgment the purpose of oral proceedings would be seriously deviated

from if amendments during oral proceedings were not allowed. Thus, although the objection and the relevant arguments were on file before the oral proceedings took place, the respondent's defence by requesting amendments shortly before and during oral proceedings are regarded as legitimate efforts to save its case. The respondent's requests are therefore admitted.

2. *Clarity and admissibility of the amendments*

In the claims under consideration the expression "an oxygen containing gas mixture" in the claims as granted have been replaced with "air at atmospheric pressure" or "one air stream at atmospheric pressure". In the Board's judgment these amendments do not introduce any unclarity and are based on the preferred embodiments of the invention as disclosed in the description (page 11, lines 15 to 20 and page 12, lines 1 to 3) and illustrated by Figures 1 to 3 of the application as originally filed. The claims under consideration, therefore, fulfil the requirements of Articles 84 and 123(2) EPC. Since the decision is in agreement with the appellant's request, there is no need to give further reasons for this finding.

3. *Main request*

- 3.1 D13 is an earlier European patent application published after the filing date of the patent in suit. Since in D13 the same contracting states are designated as in the patent in suit, its content must be considered as being comprised in the state of the art (Articles 54(3) and 54(4) EPC).

D13 discloses an integrated process for the production

of oxygen and electric power comprising the steps of:

- (a) compressing and heating air;
- (b) passing the compressed and heated air of step (a) into a membrane separation zone comprising an oxygen-selective ion transport membrane, and withdrawing therefrom a hot high-purity oxygen permeate stream and a hot oxygen-containing non-permeate stream;
- (c) introducing water into the hot oxygen-containing non-permeate stream;
- (d) heating the resulting non-permeate stream of step (c); and
- (e) passing the heated non-permeate stream of step (d) through an expansion turbine to generate shaft power and withdrawing therefrom a turbine exhaust stream (page 5, lines 5 to 27, page 6, line 55 to page 7, line 8 and Figure 1).

Since the compressed air passed to the membrane separator and the non-permeate stream passed to the expansion turbine are independently heated, the additional requirement of present claim 1, "wherein the operating temperatures of said membrane separation zone and said expansion turbine are independently maintained by controlling one or more of the variables selected from the group consisting of the rate of heat addition in step (a), the rate of heat addition in step (d), and the rate of water introduction in step (c), whereby said membrane separation zone and said expansion turbine are thermally delinked for maximum efficiency in recovering said oxygen", is implicitly also

fulfilled by the process according to D13. This finding was not in dispute.

- 3.2 It is true that D13 further requires that compressed air is also directly heated and passed to the expansion turbine without first being passed to the separation membrane. This is, however, an additional feature of the method of D13 which, as stated above, also comprises the above mentioned steps (a) to (e). The fact that in D13 the air stream passed to the membrane separator is referred to as a "borrowed stream" comprising only up to 20% of the total compressed air stream does not affect the disclosure in D13 of all the essential process steps required by present claim 1.

Also the fact that step (b) of claim 1 requires that the **resulting** compressed and heated air of step (a) is passed into a membrane separation zone (emphasis added) does not exclude the process according to D13. According to Figure 1 of D13, stream 27 passed to the membrane separator results from heating compressed air. The expression "resulting compressed and heated air" in step (b) of present claim 1 does not exclude that apart from compressing and heating air which is passed to the membrane separator, additional air is compressed and heated which is directly passed to the expansion turbine.

Since claim 1 does not exclude processes as disclosed in D13 its subject-matter lacks novelty within the meaning of Article 54(1) EPC.

4. *Auxiliary request I*

The wording of claim 1 of auxiliary request 1 differs

from claim of the main request only in that in the preamble "recovering oxygen from air at atmospheric pressure" is replaced with "treating one air stream at atmospheric pressure from which oxygen is recovered" and in steps (a) and (b) "air" is replaced with "air stream". The Board is unable to recognise any difference in substance resulting from the amended wording. Air which is passed from one place in a process to another place is inevitably passed as a stream. Also in D13 one air stream is treated in the membrane separator from which oxygen is recovered. The fact that according to D13 another air stream is treated otherwise does not affect the one air stream from which oxygen is recovered. The reasons for lack of novelty given above thus equally apply to the subject-matter of claim 1 of auxiliary request I.

5. *Auxiliary request II*

Claim 1 of auxiliary request II differs from claim 1 of auxiliary request I only in that the expression "from which oxygen is recovered" in the preamble is replaced with "whereby oxygen is recovered". Both expressions are, in fact, redundant because the circumstance that oxygen is recovered and from where it is recovered is indicated in step (b). Thus auxiliary request II must fail for the same reasons.

6. *Auxiliary request III*

Claim 1 of auxiliary request III differs from claim 1 of the main request only in that "air" in the preamble is replaced with "one air stream" and "air" in steps (a) and (b) is replaced with "air stream". For the same reasons as given under point 4, the

replacement of "air" by "one air stream" does not exclude the process according to D13. Thus also the subject-matter of claim 1 of auxiliary request III lacks novelty.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

Chairman:

P. Martorana

R. Spangenberg