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D E C I S I O N
of 3 June 1997

Case Number: T 0307/95 - 3.2.3

Application Number: 89304114.5

Publication Number: 0341854

IPC: F25J 3/04

Language of the proceedings: EN

Title of invention:

Air separation process using packed columns for oxygen and argon recovery

Patentee:

AIR PRODUCTS AND CHEMICALS, INC.

Opponent:

The BOC Group plc
Praxair Technology, Inc.
Linde Aktiengesellschaft, Wiesbaden

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

Keyword:

"Amendments - added subject-matter (yes)"

Decisions cited:

G 0001/93

Catchword:

-



Case Number: T 0307/95 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 3 June 1997

Appellant:
(Proprietor of the patent) AIR PRODUCTS AND CHEMICALS, INC.
P.O. Box 538
Allentown, PA 18195-1501 (US)

Representative:
Burford, Anthony Frederick
W. H. Beck, Greener & Co.
7 Stone Buildings
Lincoln's Inn
London WC2A 3SZ (GB)

Respondent:
(Opponent I) The BOC Group plc
Chertsey Road
Windlesham
Surrey GU20 6HJ (GB)

Representative:
Thorley, Simon Joe
6 Pump Court
2nd Floor
Temple
GB-London EC4Y 7AR (GB)

Respondent:
(Opponent II) Praxair Technology, Inc.
39 Old Ridgebury Road
Danbury, Ct. 06810-5113 (US)

Representative:
Schwan, Gerhard, Dipl.-Ing
Elfenstrasse 32
D-81739 München (DE)

Respondent:
(Opponent III) Linde Aktiengesellschaft, Wiesbaden
Zentrale Patentabteilung
D-82049 Höllriegelskreuth (DE)

Representative: -

Decision under appeal: Decision of the Opposition Division of the European Patent Office of 26 January 1995, posted on 14 February 1995, revoking European patent No. 0 341 854 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: F. E. Brösamle
Members: H. Andrá
L. C. Mancini

Summary of Facts and Submissions

- I. European patent No. 0 341 854 was granted on 25 November 1992 in response to European patent application No. 89 304 114.5 filed on 25 April 1989.
- II. Notices of opposition to this patent were filed by the respondents 1 to 3 (opponents 1 to 3). Respondents 1 and 3 requested revocation of the patent on the grounds of Articles 100(a), 100(b) and 100(c) EPC, and respondent 2 requested revocation of the patent on the grounds of Articles 100(a) and 100(c) EPC.
- III. By decision of 26 January 1995, notified on 14 February 1995, the European patent was revoked on the ground that the independent claims of all requests then valid, that is the main request and subsidiary requests 2 to 20, did not meet the requirement of Article 123(2) EPC.
- IV. On 11 April 1995, the appellant (patentee) filed an appeal against this decision paying the appeal fee on 10 April 1995. The statement of grounds of appeal was filed on 20 May 1995.
- V. In a communication pursuant to Article 11(2) RPBA of 16 April 1997, the Board set out according to their provisional opinion that the subject-matters of the independent claims of the main request and the auxiliary requests 1 and 2 submitted with the letter of 10 September 1996 appeared to infringe on Article 123(2) EPC.
- VI. Oral proceedings were conducted on 3 June 1997. Nobody was present on behalf of the respondent 3 who had been duly summoned pursuant to Rule 71(1) EPC. The proceedings, therefore, have been continued without him (Rule 71(2) EPC).

VII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request with claims 1a to 12a or on the basis of the first auxiliary request with claims 1b to 12b filed with letter of 10 September 1996 with remittal of the case to the Opposition Division.

Claims 1a and 1b read as follows:

"1a. A process for increasing argon recovery from the separation of a mixture comprising oxygen, nitrogen, and argon, by cryogenic distillation in an integrated multi-column distillation system having a low pressure column and an argon side arm column integrally communicating with the low pressure column wherein, in each column of the integrated distillation system, a liquid phase stream and a vapour phase stream are intimately contacted thereby allowing mass transfer, characterised in that the intimate contact of the liquid and the vapour phase streams in the low pressure column and the argon side arm column is carried out by utilizing a structured packing in which liquid flows over shaped surfaces in countercurrent direction to the gas flow and wherein the surface is arranged to give high mass transfer for low pressure drop with the promotion of liquid and/or vapour mixing in a direction perpendicular to the primary flow direction and in which the mass transfer occurs between flowing films of liquid and gas and is not subject to the bubbling stability limitation, and the structured packing being utilized in the regions in which the argon concentration is in the range 0.6 to 75 volume percent and that the total number of theoretical stages in the low pressure and argon side arm columns is sufficient to obtain argon in an amount greater than the maximum argon recovery in the same separation using only distillation trays in said columns, provided that said total number of theoretical trays is at least 116."

"lb. A process for increasing argon recovery from the separation of a mixture comprising oxygen, nitrogen, and argon, by cryogenic distillation in an integrated multi-column distillation system having a low pressure column and an argon side arm column integrally communicating with the low pressure column wherein, in each column of the integrated distillation system, a liquid phase stream and a vapour phase stream are intimately contacted thereby allowing mass transfer, characterised in that the intimate contact of the liquid and the vapour phase streams in the low pressure column and the argon side arm column is carried out by utilizing a structured packing in which liquid flows over shaped surfaces in countercurrent direction to the gas flow and wherein the surface is arranged to give high mass transfer for low pressure drop with the promotion of liquid and/or vapour mixing in a direction perpendicular to the primary flow direction and in which the mass transfer occurs between flowing films of liquid and gas and is not subject to the bubbling stability limitation, and the structured packing being utilized in the regions in which the argon concentration is in the range 0.6 to 75 volume percent and that the total number of theoretical stages in the low pressure and argon side arm columns is sufficient to obtain argon in an amount greater than the maximum argon recovery in the same separation using only distillation trays in said columns, provided that said total number of theoretical trays is at least 118."

VIII. The essential arguments of the appellant and of the respondents are summarized as follows:

(a) Appellant:

- The independent claims do not contain added subject-matter in the sense of Article 123(2) EPC. The total numbers of theoretical trays of at least

116 and 118, respectively, can be immediately derived from page 7, lines 19 to 21 in combination with page 5, lines 14 to 17 of the published application. The cited passage on page 7 is not limited to the distillation system disclosed in Figure 2 and to the process underlying Tables II and III and Figure 3, but is to be seen as a generalized result. The term "105% of design" is not limited to a particular design, but refers to any typical design and will therefore also be connected by the skilled person with the "typical theoretical tray count" indicated on page 5 of the published applications which will lead inevitably to the numbers of theoretical trays given in the independent claims.

- The feature "at least 116 (or 118, respectively) theoretical stages" is merely an arbitrary limitation and based on a given example of a typical tray count, it does not make a technical contribution over the invention and is irrelevant. This feature does not, therefore, extend the technical content of the application but merely limits the protection conferred by the patent by excluding protection for part of the subject-matter of the claimed invention. As the cited feature is an arbitrary restriction within the scope of the invention, the proprietor has not obtained an unfair advantage over third parties so that the incorporation of this feature is an allowable limitation pursuant to the Decision G 1/93 of the Enlarged Board of Appeal.

- In the present independent claims, the feature concerning the total number of theoretical trays has been replaced by a feature defining the number of trays with reference to the maximum argon recovery in the same separation using only

distillation trays. The proviso that the total number of theoretical trays is at least 116, respectively 118, has to be regarded as a disclaimer and can therefore be maintained in the claim in accordance with Decision G 1/93.

(b) Respondents

- The passage on page 7, lines 19 to 21 of the published application relates to a particular design as illustrated on page 6 of this document starting with line 16 and concerning the process of the system shown in Figure 2. The number of stages used in this example has not been indicated. There is no reason whatsoever for the skilled person to link this example to the passage disclosed on page 5, lines 14 to 17 of the published application. Moreover the person skilled in the art knows for example from AP D3, namely R. E. Latimer "Distillation of Air" (Chemical Engineering Progress, Vol. 63, No. 2, February 1967, pages 35 to 59) that the number of stages in the low pressure and argon column is between 40 to 90 and 30 to 70 respectively, the actual number depending on various conditions. He will not, therefore, pick out a definite number of typical tray counts and use this number as the basis for a 100% design of the invention described in the application.

- The feature concerning the total number of theoretical trays makes a significant technical contribution to the subject-matter of the invention. This fact is supported both by the prior art and by the teaching of the original application itself.

- Replacement of a feature in the claim by another feature without violating Article 123(3) EPC in the sense of the Decision G 1/93 has not taken place in the present independent claims as the feature concerned has not been removed from the claim. The exceptional possibility addressed in the above-cited decision is not, therefore, up to discussion.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
 - 2.1 The issue to be decided in the present case is the question of added subject-matter in the sense of Article 123(2) EPC. Pursuant to this regulation, a European patent application or a European patent may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed.
 - 2.2 Claim 1 contains the feature that the total number of theoretical stages in the low pressure column and the argon side arm column is sufficient to obtain argon in an amount greater than the maximum argon recovery in the same separation using only distillation trays in said columns (partial feature (a)), provided that said total number of theoretical trays is at least 116 (partial feature (b)).

2.3 Having regard to the disclosure of the above-cited feature the appellant refers to page 7, lines 19 to 21 and to page 5, lines 14 to 17 of the published application, corresponding to page 12, lines 26 to 29 and to page 8, lines 6 to 10 of the originally filed description.

The former passage reads:

"As can be seen from Figure 3 and an analysis of Tables II and III, for the partial replacement of trays, an increase in the total number of stages to only 105% of design would effectuate a greater argon recovery than is maximally possible with all distillation trays."

The latter passage is worded as follows:

"Conventionally, the distillation columns in the above processes would utilize columns with distillation trays. Although dependent upon the selected cycle, product makes, and relative values of power and capital, the typical theoretical tray counts for the high pressure column, low pressure column and argon column are: 50, 70 and 40, respectively."

The appellant argues that the feature relating to the total number of theoretical trays being at least 116 is directly and unambiguously derivable from the reference to "105% of design" when considering only the low pressure column and the argon side arm column by multiplying the 110 theoretical tray counts for these two columns with the factor of 105%.

2.4 The reference to "105% of design" is part of a longer passage starting on page 12, line 1 of the original description and dealing with the invention in which structured packing is used to partially or totally

replace the trays in the distillation system. Results of calculations for total and partial replacement of distillation trays with structured packing in a specific system are shown in Tables II to IV, starting in line 22 of page 11 of the original description and in Figure 3 of the original drawings whereby, however, relevant process factors such as for example argon product purity, column pressures, flow rates and the characteristics of the column stages used are not disclosed. The skilled person is not, therefore, provided with information relating to the number of theoretical stages used in the "design".

When reading the information given on page 8, lines 6 to 10 of the original description the skilled person is informed that in conventional distillation columns the typical theoretical tray counts for the high pressure column, the low pressure column and the argon column are 50, 70 and 40, respectively, and that these tray counts are not fixed numbers but are dependent upon conditions such as the selected cycle or the product makes. The skilled person conceives this passage as an information about the typical or average tray counts used in conventional distillation columns. No hint is provided that would link these tray counts to the "105% of design" mentioned in connection with the description of the "solution of the present invention" as outlined in the passages starting on page 9, line 4 of the original description. Moreover, as the said conventional tray counts have not been described as constituting invariable numbers or lower limit numbers of trays but as typical tray counts that vary in dependence upon the specific system and conditions provided, the skilled person would not derive from these tray counts a basis for calculating a fixed lower limit of the required total number of theoretical trays in the low pressure and argon side arm columns.

What is more, in the original description when discussing the conventional distillation columns on page 8, lines 6 to 10, reference is made to the typical tray counts for each of the columns and not for the sum of the trays in the low pressure and argon side arm columns as in claim 1a in which nothing is indicated as to the repartition of the trays between these columns.

The person skilled in the art is aware that the tray counts in the individual columns of a cryogenic distillation system for obtaining argon vary between wide ranges as for example indicated on page 51, right-hand column, paragraph 3, to page 52, left-hand column, paragraph 1 of citation AP D3. This knowledge in mind and aware of the lack of information concerning the operating parameters presumed in the calculations the results of which are shown in Tables II to IV and Figure 3 of the original description and drawings, respectively, the skilled person would conclude that the "design" could be based on any one of a wide range of theoretical tray counts. This conclusion was confirmed by the appellant who set out that "design" in the sense of the application means "any design" and embraces all general designs available in this technical field.

Thus, also for this reason the skilled person would have had no motivation to assume that a correlation between the "design" described in the context of the invention and the conventional typical theoretical tray count would yield a fixed lower limit of the total number of theoretical trays in the two columns.

- 2.5 The appellant puts forward that the feature relating to "at least 116 theoretical trays" is an arbitrary restriction within the scope of the invention which does not provide any technical contribution.

It comes within the common knowledge of the person skilled in the art of cryogenic gas separation that the number of stages used in the distillation system influences the degree of gas rectification. This applies also to the cryogenic separation of a mixture comprising oxygen, nitrogen and argon, such as air, as set forth in AP D3 (see the above-cited passages). This generally known principle is confirmed even by the original description underlying the patent in suit, see page 10, lines 24 to 26 and page 12, lines 26 to 29, which passages refer to the relationship between the number of stages in an air separation system and the degree of argon recovery in the process. Thus, the said feature which undisputedly limits the scope of protection conferred by the patent, does not form an arbitrary and technically irrelevant restriction, which merely excludes protection for part of the subject-matter of the claimed invention as covered by the application as filed, but has to be considered as providing a technical contribution to the subject-matter of the invention which moreover has a direct impact on the degree of argon recovery in the sense of the problem illustrated in the original description.

- 2.6 The appellant further argues that the feature concerning the total number of theoretical trays (see above section 2.2, partial feature (b)) has been replaced in claim 1 a by the feature defining the number of trays with reference to the maximum argon recovery in the same separation using only distillation trays (see above section 2.2, partial feature (a)) which according to the decision G 1/93 is permissible subject to compliance with Article 123(3) EPC.

Replacing a feature of a claim in the sense commonly understood by this term means taking out a feature from the claim and introducing therefor a different feature into the claim. Since both features in dispute (above-

said partial features (a) and (b)) still form part of claim 1a, no replacement of the feature concerning the total number of theoretical trays (above-said partial feature (b)) has occurred. It is thus superfluous to investigate whether it would be possible to replace said partial feature (b) by said partial feature (a) without infringing on Article 123(3) EPC.

2.7 As a result of the foregoing, the Board comes to the conclusion that claim 1a contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC) so that this claim cannot be maintained. Claims 2a to 12a fall together with claim 1a since a request can only be decided upon as a whole.

3. *First auxiliary request*

Pursuant to claim 1b of the first auxiliary request a total number of theoretical trays of at least 118 is provided.

According to the appellant's letter dated 18 May 1995, (Section 30), the theoretical tray count of at least 118 is also based on the "typical theoretical tray counts 50, 70 and 40" for the high pressure, low pressure and argon column, respectively, described on page 8, lines 6 to 10 of the original description. The theoretical tray count of at least 118 results from a calculation in which from the total number of typical theoretical tray counts of 160 multiplied with the factor of 105% the number 50 of theoretical trays in the high pressure column is deducted. Following therefrom, claim 1b of the first auxiliary request relies as to its disclosure on the same "100% of design" - arrangement as claim 1a of the main request.

Claim 1b of the first auxiliary request infringes therefore on Article 123(2) EPC for the same reasons as claim 1a of the main request and cannot be maintained.

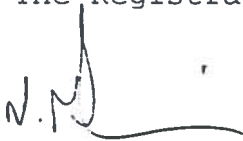
Claims 2b to 12b being part of the same request share the fate of claim 1b.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:



N. Maslin

The Chairman:



F. Brösamle