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**Datasheet for the decision  
of 18 November 2010**

**Case Number:** T 0761/08 - 3.2.03

**Application Number:** 00300563.4

**Publication Number:** 1024335

**IPC:** F25J 3/04, F25J 3/02

**Language of the proceedings:** EN

**Title of invention:**

Liquid inventory recirculation for re-startup of column for separating argon from oxygen

**Patentee:**

AIR PRODUCTS AND CHEMICALS, INC.

**Opponent:**

L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE

**Headword:**

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**Relevant legal provisions:**

EPC Art. 54(2)(3), 123(2)

**Relevant legal provisions (EPC 1973):**

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**Keyword:**

"Disclaimer relevant for inventive step"

**Decisions cited:**

G 0001/03

**Catchword:**

A disclaimer allowable in respect of a document, constituting prior art under Article 54(3) EPC, which becomes relevant for inventive step in respect of a prior art document under Article 54(2) EPC contravenes Article 123(2) EPC.



Case Number: T 0761/08 - 3.2.03

**DECISION**  
of the Technical Board of Appeal 3.2.03  
of 18 November 2010

**Appellant:**  
(Opponent)  
L'AIR LIQUIDE, S.A. A DIRECTOIRE ET CONSEIL DE  
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**Representative:**  
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**Respondent:**  
(Patent Proprietor)  
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**Representative:**  
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**Decision under appeal:**  
Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
20 February 2008 concerning maintenance of  
European patent No. 1024335 in amended form.

**Composition of the Board:**

**Chairman:** U. Krause  
**Members:** C. Donnelly  
J.-P. Seitz

## Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division, posted on 22 February 2008, to maintain European Patent No. EP-B-1024335 in amended form.
- II. The opponent (hereinafter "the appellant") filed a notice of appeal against this decision on 9 April 2008 and paid the fee the same day. In the grounds of appeal dated 20 June 2008 and received on 23 June 2008, the appellant referred to the following documents in support of its request for the contested decision to be set aside and the patent revoked:

D1: EP-A-949473 (published 13.10.1999, priority 08.04.1998)  
D8: DE-A-19734482  
D10: FR-A-2716816 (French application corresponding to US-A-55005051 cited in the examination proceedings).

- III. The patent proprietor (hereinafter "the respondent") reacted to the appeal by letter of 23 October 2008, requesting its dismissal, or alternatively, that the patent be maintained in amended form on the basis of either the first or second auxiliary request filed with the same letter.
- IV. In a communication dated 5 August 2010, pursuant to Article 15(1) RPBA annexed to the summons to oral proceedings, the board informed the parties of its provisional opinion. In particular, the board indicated that it would be necessary to assess whether the disclosure of D1 is limited to cases where the

inventory liquid is only recycled from the sump of the argon column, and whether a recirculation of the argon-rich liquid inventory to a separation section of the column prior to and during re-startup was derivable from D10.

- V. Oral proceedings before the board were held on 18 November 2010. At the end of the debate the parties confirmed the following requests:

Appellant: that the decision under appeal be set aside and the patent revoked, subsidiarily that the case be remitted to the department of first instance if the respondent's auxiliary requests 1 and 2 need to be dealt with.

Respondent: that the appeal be dismissed or, subsidiarily, that the case be remitted to the department of first instance if auxiliary requests 1 and 2 need to be dealt with.

- VI. Claim 1 as maintained by the opposition division reads:

"A process for separating mixtures which comprise oxygen and argon by cryogenic distillation in a distillation system comprised of at least one argon separation rectification column that produces an oxygen stream and an argon stream from a vapour feed stream consisting essentially of oxygen and argon and wherein an argon rich liquid inventory is returned to the column after an interruption of flow of said feed stream into the argon-separation column, characterised in that

during an interruption of flow of said feed stream into the argon-separation column, argon-rich liquid inventory in said column is recirculated, prior to and during re-startup of said column, to a separation section of said column that is above the location of withdrawal of said inventory; excluding processes in which said liquid inventory is collected from the sump of the argon-separation column or, when the system has two argon-separation columns, jointly from the sumps of each argon-separation column of the system and is recirculated through the or each of the columns."

Independent claim 24 according to the main request reads as follows:

"A cryogenic distillation system for a process as defined in claim 1, said system comprising:  
at least one argon-separation column (100);  
collection means (111;211;311 &312;411&421) for collecting recirculation liquid inventory from said column; and  
recirculation means (112-115; 413-414 & 422-424) for selectively recirculating argon-rich liquid inventory from said collection means to a separation section of said column,  
characterized in that said collection means collects liquid inventory from an intermediate location of said column."

Independent claim 35 according to the main request reads as follows:

"A cryogenic-distillation system for a process as defined in claim 16, said system comprising a first argon-separation column (500); a second argon-separation column (504) connected in series with said first column (500); collection means (sump of 504) for collecting argon-rich recirculation liquid inventory from said second column (504) but not said first column (500); and recirculation means (505-508) for selectively recirculating a respective portion of liquid inventory from said collection means to a respective separation section of each of said first and second columns."

VII. The arguments of the parties can be summarised as follows:

*(i) Added subject-matter, Article 123(2) EPC*

*Appellant*

According to decision G 1/03, in order to meet the requirements of Article 123(2) EPC, disclaimers cannot eliminate more subject-matter than is strictly necessary to restore novelty.

However, in this case, the disclaimer is drafted too broadly since it comprises configurations for argon separation which are not specifically disclosed in D1. In particular, it disclaims the case in a double argon column system wherein liquid is recirculated from the

sump of one of the argon columns back to the same column.

An example of a further arrangement excluded by the disclaimer but not comprised in D1 is shown in DE-A-19734482 (D8).

*Respondent*

The appellant is misinterpreting the scope of the disclaimer which is clearly split into two parts. The first part specifies "*the* sump of *the* argon-separation column"; by such use of the definitive article it is clear that only a single column is meant. Such systems are shown in figures 3 and 4 of D1. The second part is delimited from the first by commencing with the word "or" and then specifying that it applies for the case "when the system has two argon-separation columns". The particular disclaimed arrangement is shown in figure 5 of D1. To eliminate any doubt the appellant accepts that this interpretation be put in writing and attached to the minutes.

D8 describes a system comprising a denitrogenisation column which processes argon product from an argon-separation column. However, such a denitrogenisation column is not an argon separation column as required by claim 1.

Thus, no more has been disclaimed than is disclosed in D1 and the requirements of Article 123(2) EPC are not infringed.



*(ii) Novelty with respect to D1*

*Appellant*

D1 provides a broad teaching as to where the liquid the liquid for recirculation in the re-starting of the distillation column should be taken. Paragraph [0009] sets out the basic steps of the procedure in these broad terms. Paragraphs [0013] and [0016] are equally broad in just referring to "collected liquid" and "collecting descending liquid" for use in the reinventory of the internal material of the column. Paragraph [0017] refers to preventing mixing of the descending liquid and the liquid in the bottom of the column. Paragraph [0018] then refers directly to the case of the argon column stating that "collection of descending liquid in the argon column also facilitates a more efficient restart". The specific description of how this applies to an argon column is given in [0032] where it is stated that "The collected liquid may be stored in a holding vessel" and that it is only "desirable for any liquid in the column sump to be collected along with the liquid from the column separation section".

From this it is unambiguously and directly derivable that the collected liquid which is recirculated in the argon column may come from the holding tank which does not contain liquid from the sump. In any case the holding tank is not the same thing as the sump, thus the disclaimer does not cover these cases and claim 1 is not new.

Further, in the system of figure 5, the columns 50A and 50B are, in process terms, a single column; the split into two sections having been merely made to reduce the height of the column. This interpretation is supported by the description D1 at paragraph [0044] where reference is made to a "two section argon column" and to the fact that "The split column of Fig. 5 is sometimes desired to meet column height restrictions". Thus, liquid 83 must be considered to be at an intermediate level and therefore the subject of claims 1 and 24 is not new.

Also, figure 5 of D1 shows a process in which the descending liquid in column 50A can be sent via piping 75 to the bottom of the additional column 50B, but not necessarily so since the flow can be cut off by the valve in line 75. Thus, in order to establish novelty, the disclaimer should also exclude cases in which the liquid inventory made up of liquid coming solely from the second of the two columns is then sent to both columns.

*Respondent*

The appellant is confusing restarting the standard double column with the argon column. In the double column it is very important to prevent pollution of the sump liquid with descending liquid whereas for the argon column the opposite is true. Hence, paragraph [0017] refers only to the case of a distillation column "where there is a main condenser", such as in the double column arrangement. There is no condenser in an argon column where the situation is completely different and liquid must be collected in the sump. The

skilled person would only understand this from the description of D1, this is what is shown in the figures and nothing else is unambiguously derivable.

The appellant's assertion that the argon column shown in figure 5 of D1 is a single column is clearly wrong because two columns with separate sumps are shown.

Furthermore there is no indication that the valve 75 is ever closed during restarting, the mere statement that something can be done does not constitute a disclosure that it cannot be done. Furthermore, it would be inconsistent to return the argon-enriched liquid inventory of the first argon-separation column to the lower pressure column.

As regards claim 35 the presence of a valve in conduit 75 feeding liquid inventory from the sump of the first argon-separation column to the sump of the second does not obviate the fact that the apparatus includes collection means for collecting argon-rich recirculation liquid inventory from the first column. The valve is just intended to allow the conduit to be closed during normal operation.

*(iii) Novelty with respect to D10*

*Appellant*

D10, in particular figure 4, discloses all the features of claim 24 and all of claim 1 with the exception of the disclaimer.

*Respondent*

D10 discloses an air separation process in which liquid inventory in an argon-separation column stored during interruption in operation is recycled prior to re-start up. A valve in a liquid return conduit from the sump of the argon-separation column to the main air-separation column is controlled to maintain a constant liquid level in that sump and then progressively reduce the level to a normal operating level. In figure 4 there is a supplemental return conduit 38 that returns liquid to an upper portion of the distillation section 8. This conduit is controlled by valve 39 and only open prior to restart of the column as is stated at column 5, lines 56 to 57 of the equivalent document US-A-5505051 "When the valve 39 is closed, restarting is effected as described above". In D10 the equivalent passage at page 11, lines 12 to 13 reads "Lorsque la vanne 39 est fermée, on poursuit le redémarrage comme décrit plus haut". At page 10, lines 33 to 34 it is stated "Avant de redémarrer, on ouvre la vanne 39" (Before restarting, the valve 39 is opened". Thus, liquid is only recycled prior to restarting, but not during.

The reason for recycling liquid inventory in the process of D10 is to stop the inventory entering the main air separation system so as not to reduce the purity of the oxygen product. The supplemental return arrangement of the embodiment of Figure 4 is to reduce the level of liquid in the column from the stoppage level N3 above the vapour feed from the main air separation system to a level N2 below that feed in order to permit re-start up of the column.

Figure 4 of D10 does not disclose an apparatus according to claim 24 since the trough 11 is not at an intermediate location.

## Reasons for the decision

1. The appeal is admissible.
2. Main request - Claim 1, Validity of disclaimer with respect to D1, Articles 123(2) and 54 EPC.
  - 2.1 EP-A-949473 (D1) constitutes prior art under Article 54(3) EPC for all of the contracting states DE, FR & GB for which the patent has been nationalised (see respondent's letter of 2 October 2006, point 2.2). This document (see in particular figure 3,4 and 5) describes:

a process for separating mixtures which comprise oxygen and argon by cryogenic distillation in a distillation system comprised of at least one argon-separation distillation column (30;50;50A,50B) that produces an oxygen stream and an argon stream from a feed stream (31) consisting essentially of oxygen and argon and wherein an argon rich liquid inventory (40;51;83) is returned (38;60;76,90) to the column (30;50;50A,50B) after an interruption of flow of said feed stream into the argon-separation column,

wherein

during an interruption of flow of said feed stream (31) into the argon-separation column (30;50;50A,50B), argon-rich liquid inventory (40;51;83) in said column is recirculated, prior to and during re-startup of said

column, to a separation section of said column that is above the location of withdrawal of said inventory.

- 2.2 Thus, apart from the disclaimer, the subject-matter of claim 1 is known from D1. Since D1 is prior art under Article 54(3) EPC it is permissible to restore novelty by using a disclaimer (see G 1/93, Headnote 2.1). However, the disclaimer should not remove more than is necessary to achieve this (see G 1/93, Headnote 2.2).

- 2.3 The disclaimer added to claim 1 reads:

"excluding processes in which said liquid inventory is collected from the sump of the argon-separation column or, when the system has two argon-separation columns, jointly from the sumps of each argon-separation column of the system and is recirculated through the or each of the columns."

The board agrees with the respondent that the disclaimer is split into two parts. The first part refers to a single argon column configuration as shown in figures 3 and 4 of D1. The second part refers to a system having two argon-separation columns as shown in figure 5 of D1. Furthermore, the appellant has explicitly confirmed this interpretation in writing (see attachment to the minutes).

- 2.4 The disclaimer also does not remove any more than is necessary to restore novelty with respect to D1 since it is based on the embodiments disclosed in figures 3,4 and 5 of D1.

2.5 The board agrees with the respondent's view that the system in D8 comprises a denitrogenisation column as opposed to an argon-separation column as required by claim 1.

2.6 Thus, with respect to D1 the disclaimer meets all the requirements laid out in G 1/03.

3. *Novelty objections with respect to D1*

3.1 The appellant has also presented several lines of argument to show that, despite the addition of the disclaimer, the subject-matter of claim 1 is still not new with respect to D1.

The board does not find any of these arguments convincing.

3.2 The skilled person knows that, due to their differing distillation profiles, during re-startup of a double column it is important to prevent pollution of the sump liquid with descending liquid whereas for the argon column the opposite is true. This is confirmed in paragraph [0017] of D1 where reference is only made to the case of a distillation column "where there is a main condenser", such as would be found in the double column arrangement. The situation in the argon column is different and there is no need to prevent the descending liquid reaching the sump. This is stated in paragraph [0032] of D1, final sentence reading "For argon columns, it is desirable for any liquid in the column sump to be collected along with the liquid from the column separation section". As argued by the respondent this does not present the skilled reader

with an option, but confirms what is shown in the figures and nothing else is unambiguously derivable.

- 3.3 The appellant has also suggested that the subject-matter of claims 1 and 24 is not new since the argon column shown in figure 5 of D1 is in fact a single column. The board is not convinced by this since two columns with separate sumps are shown. These might in some ways be the equivalent of a single column, but physically two columns, each with a separate sump are present.
- 3.4 Also regarding figure 5 of D1, there is no indication that the valve in line 75 is ever closed during restarting. A statement to the effect that something can be done does not constitute a disclosure that it cannot be done. Furthermore, it would be inconsistent to return the argon-enriched liquid inventory of the first argon-separation column to the lower pressure column for the reasons indicated at paragraph [0033] of D1.
- 3.5 With respect to the independent apparatus claim 35, the presence of a valve in conduit 75 feeding liquid inventory from the sump of the first argon-separation column to the sump of the second does not alter the fact that the apparatus includes collection means for collecting argon-rich recirculation liquid inventory from the first column and that conduit 75 connects the two columns which is not the case in the apparatus of claim 35.



4. *Novelty with respect to D10*

4.1 As regards D10, this document shows that liquid from the sump of the argon-separation column always contributes to the re-circulated liquid inventory. Figure 4 of this document discloses:

a process for separating mixtures which comprise oxygen and argon by cryogenic distillation in a distillation system comprised of at least one argon-separation rectification column (2) that produces an oxygen stream and an argon stream from a feed stream (27) consisting essentially of oxygen and argon and wherein an argon rich liquid inventory from trough (11) and the sump is returned (38) to the column (2) after an interruption of flow of said feed stream (27) into the argon-separation column, wherein during an interruption of flow of said feed stream (27) into the argon-separation column (2), argon-rich liquid inventory in said column is recirculated (38) prior to re-startup of said column, to a separation section (8) of said column that is above the location of withdrawal of said inventory.

4.2 Thus, disclaimer apart, the only contentious feature is whether liquid is also re-circulated to the column "during re-startup of said column".

4.3 In order to assess this it is necessary to define the term "re-startup".

According to the description of the contested patent at page 3, line 48 to 49, "the re-startup process is over when the column reaches its steady state conditions"

and from page 3, line 50 the sidearm column "approaches steady state conditions" during the startup process. A process interruption is defined, for example, at page 4, line 55 to 56 as being something which causes the vapour stream 102 to be reduced or cease flowing altogether. Thus, the patent refers to three distinct phases: steady state, process interruption and re-startup. In the event of an interruption and subsequent re-startup, the system would therefore pass through the following cycle: steady state conditions, interruption, re-startup and finally back to steady state.

Accordingly, the re-startup phase is all of the period between the end of interruption and reattainment of the steady state. In view of this, the board considers that the re-startup phase commences as soon as the process interruption is terminated by re-establishing flow in the vapour feed line to the argon column.

- 4.4 D10 at page 11, lines 12 to 13 states "Lorsque la vanne est fermée, on *poursuit* le redémarrage comme décrit plus haut" which indicates that the re-startup phase of D10 is "continued" rather than "effected". At page 11, line 6 of D10 it is indicated that the condenser 7 is started ("on démarre le condenseur"), and only then is a progressive closing of the valve undertaken ("on referme progressivement la vanne 39"). In order for the condenser to function vapour must be flowing through the feed stream 27. Thus, the valve 39 is still open and allowing argon-rich liquid to be recycled to the upper part of the distillation section 8 (see page 10, line 35 to page 11 line 1) when the condenser starts working and vapour starts flowing through line 27.

- 4.5 The progressive closing of the valve 39 is accompanied by a progressive opening of the valve 15 in order to direct an increasing flow of liquid to the low-pressure column 5, thereby maintaining the liquid level N2 in the sump of column 2 constant (see page 11, lines 9 to 12).
- 4.6 The respondent's argument that the supplemental return in Figure 4 is only to reduce the level of liquid in the column from the stoppage level N3 above the vapour feed from the main air separation system to a level N2 below that feed in order to permit re-startup of the column is not entirely correct.
- 4.7 The process according to D10 comprises a pre-startup stage whereby the liquid level in the sump is reduced from N3 to just below the distributor plate to free up the mouth of the vapour feed line 27, allowing vapour to be fed into the column and the condenser to be restarted. The point at which the vapour feed into the column in D10 is resumed corresponds to the beginning of the re-startup phase in the contested patent as outlined above.
- 4.8 However, since both valves 39 and 15 are closed and opened "progressively", in the manner described above, *after* the condenser has been restarted by terminating the interruption of the vapour supply through line 27, it must also be that liquid is re-circulated to the column at least during part of the re-startup phase of said column.
- 4.9 The notion of a progressive reduction in recirculated liquid inventory is also mentioned in the contested

patent at page 3, lines 51 to 52 where it is stated that "Moreover, as the sidearm column advances from being shut-down to its normal operating conditions, the amount of liquid inventory being recirculated is progressively reduced."

4.10 Consequently, the only difference between the subject-matter of claim 1 and that of the process according to figure 4 of D10 lies in the disclaimer. Therefore this feature alone establishes novelty.

4.11 In this case, since D10 is prior art under Article 54(2) EPC, it is also inevitably relevant for the question of inventive step.

4.12 However, according to G 1/03 (see Headnote 2.3):

"A disclaimer which is or becomes relevant for the assessment of inventive step or sufficiency of disclosure adds subject-matter contrary to Article 123(2) EPC."

4.13 Thus, with respect to D10, the disclaimer does not meet the provisions of Article 123(2) EPC and claim 1 of the main request is not allowable.

5. *Further prosecution of the case*

5.1 The board sees no reason to go against the request of both parties for the case to be remitted to the opposition division should the main request of the respondent be refused.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division for further prosecution on the basis of the auxiliary requests 1 and 2 filed on 27 October 2008.

The Registrar:

The Chairman:

A. Counillon

U. Krause