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D E C I S I O N
of 6 November 2001

Case Number: T 0326/00 - 3.2.3

Application Number: 95108139.7

Publication Number: 0684436

IPC: F25J 3/04

Language of the proceedings: EN

Title of invention:

Cryogenic rectification system capacity control method

Patentee:

PRAXAIR TECHNOLOGY, INC.

Opponents:

L'AIR LIQUIDE, Société Anonyme pour L'étude et L'exploitation
des procédés
Georges Claude
LINDE AKTIENGESELLSCHAFT

Headword:

-

Relevant legal provisions:

EPC Art. 52, 56

Keyword:

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0326/00 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 6 November 2001

Appellant: LINDE AKTIENGESELLSCHAFT
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Representative: -

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted 24 January 2000
rejecting the opposition filed against European
patent No. 0 684 436 pursuant to Article 102(2)
EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: J. du Pouget de Nadaillac
M. K. S. Aúz Castro

Summary of Facts and Submissions

I. The appeal is directed against the decision dated 24 January 2000 of an opposition division of the European Patent Office, which rejected the two oppositions filed against European patent No. 0 684 436 on the grounds of Article 100(a) EPC (novelty and inventive step). The patent includes a single independent claim, which reads as follows:

"1. A method for changing the capacity of a cryogenic rectification plant comprising:

(A) passing a fluid (23) at a first flowrate into the higher pressure column (4) of a cryogenic rectification plant comprising said higher pressure column and a lower pressure column (6);

(B) passing liquid from the sump of the higher pressure column (4) into the lower pressure column (6);

(C) maintaining the liquid in the sump of the higher pressure column (4) at a desired level;

characterised in that

(D) the liquid in the sump of the higher pressure column (4) is maintained at a desired level by means of a sump level controller (104) having a setpoint set at the desired level;

(E) the setpoint of the sump level controller (104) is changed to be at a lower level, when the feed flowrate is changed to be at a second flowrate exceeding the first feed flowrate; and

(F) the setpoint of the sump level controller (104) is changed to be at a higher level, when the feed flowrate is changed to be at a second flowrate being less than

the first flowrate."

- II. Opponent II - hereinafter the appellant - filed the notice of appeal on 29 March 2000 and paid the appeal fee on the same day. The statement of grounds of appeal was received on 31 May 2000.

- III. Oral proceedings were held on 6 November 2001. Nobody was present on behalf of the Party to appeal proceedings as of right in accordance with Article 107 EPC (Opponent I), which had been duly summoned, but had by a letter dated 17 September 2001 declared that it would not participate in these proceedings. Pursuant to Rule 71(2) EPC, the proceedings were continued without this party.

In these oral proceedings, the appellant dropped its previous objection relating to the lack of novelty, which in the written proceedings had been raised having regard to the document referenced E1 (US-A-3 912 476), and essentially based its arguments concerning the lack of inventive step on the citations E2 (DE-B-27 44 625) and E3 (JP-A-54-23 073, Abstract).

It requested that the decision under appeal be set aside and that the European patent No. 0 684 436 be revoked.

The respondent (proprietor of the patent) requested that the appeal be dismissed.

- IV. The arguments of the parties are summarized as follows:

From the appellant:

The citation E2 should be considered as representing the closest prior art, since on the one hand it deals with the same problem, namely how to avoid a modification of the ratio liquid flow/vapour flow inside the lower pressure column of a double column plant when, due to a demand change of a product even for a short time, the feed flowrate is changed, and since on the other hand it teaches the same general solution: in case of a demand for more product and, consequently, an increase of the feed air flowrate the flow of the oxygen-enriched liquid (also called the "kettle liquid") has to be increased from the sump of the high pressure column (HP column) to the low pressure column (LP column), whereas in case of a lower demand and consequent a decrease of the feed air flowrate, said oxygen flow has to be decreased. E2, further, teaches that both increases or decreases can be done simultaneously. According to the solution as claimed in the patent in suit, this change of the kettle liquid flow is made by lowering the level of the liquid in the sump of the HP column. However, this solution is obvious by itself, since an increase of the kettle liquid flow in the pipe between the HP and LP columns necessarily implies a lowering of the liquid level in the sump of the HP column and, similarly, a decrease of the sump liquid level is automatically linked to an increase of the liquid flow from this sump to the BP column. Moreover, the skilled person knows that the liquid level in the sump of a HP column must be controlled, because it has to remain in a relatively narrow band, as is confirmed by the patent in suit. Therefore, the skilled person is necessarily led to change the kettle liquid flow between both columns by controlling the liquid level in the HP column sump. Thus, document E2 combined with the general knowledge

of the person skilled in the art leads to the claimed solution.

The obviousness of the claimed solution can also be seen by combining E2 with E3, since the citation E3, which also deals with the same problem, shows in its figure that the level of the liquid in the sump of the HP column can be controlled by means of a particular output pipe which directly feeds the liquid into the usual conduit for the kettle liquid between the HP and LP columns.

From the respondent:

The fact that the flow of the kettle liquid is increased does not necessarily mean that the level of the liquid in the sump of the HP column is lowered. There is no automaticity in this respect and the liquid level in the sump can fluctuate in both directions, that is to say up and down relative to its initial level. Of course, it has to be maintained in a narrow band, but the tendency until the present invention was to maintain this level constant, as shown by E1. Moreover, one has to distinguish between an accidental and provisional change in the liquid level of a sump and a controlled modification of this level. All the cited documents, and in particular E3, are quite silent upon a desired (voluntary) change of the level of the sump liquid as a solution for the problem underlying the present invention.

Reasons for the Decision

1. The appeal is admissible.

2. None of the prior art documents cited before the first instance discloses a voluntary change of the setpoint of the sump level controller of the HP column, so that the subject-matter of claim 1 of the patent in suit is new (Articles 52 and 54 EPC). In particular, E1 always refers to a **constant** level of the liquid in the sump of the HP column. This issue was no more disputed. However, it remains to decide whether the subject-matter of claim 1 involves an inventive step.

3. The citation E2, which was considered by the appellant in the oral proceedings to represent the closest prior art, describes a method for controlling a cryogenic air separation plant during a variation of the product demand, which requires a variation in the same direction, that is to say an increase or a decrease, of the air flow fed to the double-column plant. A change in the air feed flowrate causes a modification of the liquid to vapour (L/V) ratio within the columns. However, it is important that during any variation, even for a short period, of the product demand the purity of the product and, consequently, the said L/V ratio remain constant. To solve this problem, which corresponds to that of the patent in suit, E2 teaches to control several parameters of the plant, and in particular the flowrate of the kettle liquid passing from the sump of the HP column into the LP column, in such a way that the kettle liquid flow is increased to a higher value when the air flow fed to the plant is increased and vice-versa.

4. A sump level controller is not mentioned in E2. Therefore, the method according to claim 1 differs from the method known from E2 by the characterising features (D) to (F). However, feature (D), namely the use of a

sump level controller, is a routine measure in this technical field, since it is known that the level of the liquid in the sump of the HP column is to be maintained in a rather narrow range in order to allow the operation of the plant.

Important for the invention are, therefore, the features (E) and (F). According to the description of the patent in suit, the method according to claim 1 solves the problem of providing a method for changing the capacity of a cryogenic rectification plant in a controlled manner without the need for storage or holding plants to adjust the L/V ratio of a column.

By modifying the set point of the liquid level of the HP column sump the present invention allows to quickly respond to a possible change of the L/V ratio during a variation of the feed air flowrate, since by this measure additional liquid is immediately provided from the sump to the middle of the LP column. This mitigates the effect of the so called "HP column hydraulic delay", which occurs at the beginning of the transitional period and is the delay due to the quick increase of the modified flow of vapours inside the HP column in the case of an increase of the feed air flowrate compared to the slower formation of the liquid condensed in the main condenser and transfer of this liquid from the top to the bottom of the column and into the LP column, this delay causing the L/V ratio to change. The additional liquid fed to the LP column from the sump of the HP column on lowering the set level thereof avoids a temporary L/V change without the need of liquid provided from any stocking tanks. In case of a decrease of the air feed flowrate the effects are opposite. Thus, the object of the present invention is

therefore achieved by the features (F) and (E) of claim 1 of the patent in suit.

5. That, in the process according to E2, the liquid level of the HP column sump may be - accidentally or occasionally- increased to a higher level when the feed air flowrate is increased and vice versa is not relevant, since the contested patent is to be assessed according to a different criterion: it requires a systematic lowering or increase of the liquid level setpoint, which cannot be compared with an accidental similar change. Thus, the argument of a lack of inventive step based only on a natural phenomenon which according to the appellant should occur in the method according to E2 cannot be followed. Moreover, the appellant has not provided any evidence that this really occurs.

6. The further argument of the appellant, that the skilled person, who is well aware of the presence of level controllers for the sump of the HP column, would use it for the claimed method steps, can only be seen as an a posteriori view in the absence of any evidence. In E2 itself, it is indicated at the end of the description, see column 7, lines 24 and 25, in combination with column 5, lines 2 to 49, that the variation of the feed air flowrate should only occur when, among others conditions, the level of the "liquid air", that is to say that of the kettle liquid, is in its usual position. Moreover, in contradiction with the appellant's argument, the citation E1, which also aims at maintaining the L/V ratio constant during variations of the plant capacity, teaches to maintain the sump level constant.

The appellant also referred to the figure of the abstract of E3. However, this figure only shows a conduit connecting the upper liquid level zone of the kettle liquid sump to the control valve of the output line of this sump, that is to say it only discloses the usual level controller means for the liquid level in the HP column sump. There is no indication whatsoever to use these means in any way other than as usual, i.e. to keep the liquid level constant.

7. In all other cited documents, there is not the slightest suggestion of acting on the sump level controller, which usually is only there to keep the sump liquid at a predetermined and constant level.

It follows from the above that it was not obvious to arrive at the claimed method in view of the cited prior art. Therefore, the subject-matter of claim 1 is considered to involve an inventive step as is required by Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:

A. Counillon

C. T. Wilson