BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 5 May 2006

Case Number: T 0552/04 - 3.3.10

Application Number: 97937897.3

Publication Number: 0923541

IPC: C07C 273/12

Language of the proceedings: EN

Title of invention:
Process for the preparation of urea

Patentee:
DSM IP Assets B.V.

Opponent:
Agrolinz Melamin GmbH
UREA CASALE S.A.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
"Main request: inventive step (no)"
"First auxiliary request: inventive step (no)"
"Second auxiliary request: not admitted into the proceedings - not clearly allowable - late filed"

Decisions cited:
T 0109/82, T 0323/99, T 0946/00

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0552/04 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 5 May 2006

Party as of right: (Opponent 01)
Agrolinz Melamin GmbH
St.-Peter-Strasse 25
A-4021 Linz (AT)

Representative:
Maikowski, Michael
Patentanwälte
Maikowski & Ninnemann
Kurfürstendamm 54-55
D-10707 Berlin (DE)

Appellant: (Opponent 02)
UREA CASALE S.A.
Via Sorengo 7
CH-6900 Lugano-Besso (CH)

Representative:
Zardi, Marco
M. Zardi & Co. SA
Via Pioda, 6
CH-6900 Lugano (CH)

Respondent: (Patent Proprietor)
DSM IP Assets B.V.
Het Overloon 1
NL-6411 TE Heerlen (NL)

Representative:
-

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 12 February 2004 concerning maintenance of European patent No. 0923541 in amended form.

Composition of the Board:

Chairman: R. Freimuth
Members: P. Gryczka
J. Seitz

Summary of Facts and Submissions

I. The mention of the grant of European patent 0 923 541, in respect of European patent application No. 97937897.3, which is based on the International application PCT/NL97/00493 filed on 29 August 1997, was published on 23 May 2001.

II. Two notices of opposition were filed in which revocation of the patent in its entirety was requested on the grounds of lack of novelty and inventive step (Article 100(a) EPC).

Inter alia, the following documents were cited during the opposition proceedings:

(1) GB-A-1 309 275,

(7) SU-A-899 538, in the form of its translation into english,

(10) Kirk-Othmer, Encyclopedia of Chemical Technology, third Edition, Volume 23 (1983), pages 548 to 562 and

(14) Ullmann's Encyclopedia of Industrial Chemistry, fifth Edition, Volume A27 (1996), pages 333 to 365.

III. In an interlocutory decision issued in writing on 12 February 2004, the Opposition Division found that the European patent could be maintained in amended form on the basis of claims 1 to 9 filed at the oral proceedings as sole request. Claim 1 of said request read as follows:

"1. A stripping process for the preparation of urea in a urea stripping plant having at least one high-pressure section, comprising at least a urea reactor (A), a stripper (B) and a carbamate condenser (C), whereby decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia are conducted at a pressure which is substantially equal to the pressure in the synthesis reactor, wherein said process comprises the step of supplying a gas stream (13, 213, 313, 413, 513) released from a high-pressure process for making melamine, operating at a pressure between 12.5 MPa and 80 MPa, to at least one high pressure section of said urea stripping plant, operating at a pressure between 12.5 MPa and 17.5 MPa, wherein said gas stream has a temperature between 160°C and 285°C and consists essentially of ammonia and carbon dioxide."

Claims 2 to 9 related to specific embodiments of the process according to claim 1.

The Opposition Division came to the conclusion that the amended claims fulfilled the requirements of Articles 84, 123(2) and (3) EPC and that the claimed process was novel. The combination of the production of urea and melamine was well known in the art. The technical problem underlying the patent in suit was the provision of an alternative integrated urea-melamine production process which was efficient with respect to energy consumption and which was industrially facile with respect to the equipment needed. An essential feature of the claimed process was the fact that the

decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia were conducted at a pressure which was substantially equal to the pressure in the synthesis reactor. The presence of an inventive step was acknowledged since the advantageous combination of features defining the claimed process could not be derived in an obvious manner from the cited prior art.

IV. The Opponent 02 (Appellant) lodged an appeal on 8 April 2004 against the above decision.

V. With a letter dated 5 April 2006, the Respondent (Proprietor of the patent), while maintaining the set of claims underlying the decision under appeal as main request, filed a fresh set of seven claims as first auxiliary request. Claim 1 of said request differs from claim 1 of the main request by the addition of a list of particular sections to which the gas stream released from the process for making melamine is supplied, i.e. " to the stripper (B), the carbamate condenser (C), a flash vessel (Q) installed between the stripper (B) and the carbamate condenser (C) or a pipelines between any thereof."

During the oral proceedings held before the Board on 5 May 2006, the Respondent filed a further set of seven claims as second auxiliary request. Claim 1 of said request differs from claim 1 of the first auxiliary request by the addition of the word "said" before the second expression "at least one high-pressure section".

VI. The Appellant considered document (1) as representing the closest prior art since it related as the patent in suit to a combined process for preparing urea and melamine. Since no technical effect or improvement was achieved by the claimed process, the problem solved by the invention underlying the patent in suit was only to provide an alternative to the process disclosed in document (1). The solution to that problem was characterised by operating the stripper and the urea reactor at the same high pressure. These operating conditions were however obvious for the skilled person when considering the teaching of documents (10) or (14) since both documents disclosed that the urea reactor, the stripper and even the condenser should operate at the same high pressure of 14 MPa. Thus, the claimed process did not involve an inventive step. The feature added to claim 1 of the first auxiliary request, namely that the gas stream coming from the melamine synthesis was supplied to a specific section of the urea stripping plant, could not support any inventiveness since the patent specification mentioned that the stream could be fed at any locus. The application as filed did not mention that the high pressure section comprising the reactor (A), the stripper (B) and the carbamate condenser (C), whereby decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia were conducted at a pressure which was substantially equal to the pressure in the synthesis reactor, was the same as the high pressure section to which the gas stream released from the melamine synthesis was supplied. Thus, claim 1 of the second auxiliary request had no basis in the application as filed and contravened Article 123(2) EPC.

VII. The Party as of right (Opponent 01) considered the process disclosed in document (7) as representing the closest prior art since it related also to a combined process for preparing urea and melamine in which the urea was produced by a stripping process. With regard to this prior art the objective problem solved by the invention underlying the patent in suit was the provision of a process integrating the production of melamine and urea which consumed less energy and involved less costs. The claimed process differed from the process disclosed in document (7) only by the fact that the decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia were conducted at a pressure which was substantially equal to the pressure in the synthesis reactor. However, this feature was suggested by the documents (10) and (14) which taught to operate the urea reactor and the stripper at the same high pressure. Thus, the claimed process did not involve an inventive step.

With regard to the first and second auxiliary requests the Party as of right relied in essence on the same objections as the Appellant.

VIII. The Respondent considered that document (1) or (7) could qualify as closest prior art since both related to an integrated system for the synthesis of urea and melamine. However, none of these documents related to a stripping process which required that the urea reactor and the stripper were operated at the same pressure, that only carbon dioxide and ammonia in gas phase were recycled and, finally, that energy was recovered during

the process and reused in the form of steam. The objective technical problem solved by the claimed process was to provide an integrated system for the preparation of melamine and urea having an improved energy efficiency when compared to the processes of documents (1) or (7). The skilled person would not find in any of the documents (1), (7), (10) or (14) an incentive to incorporate the features distinguishing the claimed process from the closest prior art to solve that technical problem. In fact, documents (1) and (7) did not suggest the use of a stripping process for producing urea and documents (10) and (14) did not refer to the technical problem on hand since they did not concern an integrated system for the preparation of urea and melamine. In addition, the combination of a stripping process for preparing urea with a process for preparing melamine under high pressure had never been reported in the art, although both processes were well known to the skilled person since at least 30 years before the filing of the patent in suit. However, the skilled person did not combine both processes since he was not assured that the combination would be successful. For these reasons, the claimed subject-matter involved an inventive step. According to claim 1 of the first auxiliary request the ammonia and carbon dioxide released from the melamine process was supplied to specific regions of the high pressure urea plant, excluding the urea reactor itself. This was a further characteristic distinguishing the claimed process from the process disclosed in documents (1) and (7), since in both documents the gas was directly supplied to the urea reactor. The amendment to claim 1 of the second auxiliary request clarified that the two expressions "high-pressure section" to which the claims referred

defined in fact the same section. The amendment was based on two passages of the description of the application as filed and was thus in conformity with the requirements of Article 123(2) EPC.

IX. The Appellant requested that the decision under appeal be set aside and that the patent be revoked. The Party as of right supported the request of the Appellant.

The Respondent requested that the appeal be dismissed and subsidiarily that the patent be maintained on the basis of claims 1 to 7 of either the first auxiliary request filed with the letter dated 5 April 2006 or the second auxiliary request filed during the oral proceedings before the Board.

X. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

It was not contested that the claims in accordance with the main request find a basis in the application as filed, that they do not extend the protection conferred by the patent as granted and that the amended features are clear (Articles 123(2) and (3) and 84 EPC). In view of the negative outcome with respect to the issue of

inventive step (see point 4 below), it is unnecessary to go into more detail in this respect.

3. *Novelty*

The Appellant and the Party as of right did not raise any objection with regard to the novelty of the claimed process. The Board on its own does not see any reason to take a different view. Hence, it is also unnecessary to go into more detail in this respect.

4. *Inventive step*

4.1 For the assessment of inventive step in accordance with the "problem-solution approach", it is necessary to establish which document represents the closest prior art in order to determine in the light thereof the technical problem which the invention addresses and solves. The "closest prior art" is normally represented by a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common (Case Law of the Boards of Appeal of the EPO, 4th. Edition 2001, I.D.3.1).

4.2 The patent in suit is directed to a process for the preparation of urea involving supplying a gas stream released from a high-pressure process for making melamine.

4.3 The preparation of urea connected to the preparation of melamine belongs to the state of the art, as evidenced by documents (1) or (7). The Appellant and the Respondent considered that document (1) represented the

closest prior art. The Party as of right, although referring to document (7) as closest prior art, considered that document (1) could also be a good starting point for the assessment of inventive step. In these circumstances and since document (1) is cited as the closest prior art in the patent specification (page 2, paragraphs [0005] and [0006]), it is appropriate to start the assessment of inventive step from that document.

Document (1) relates to a process for synthesizing urea from a gaseous mixture containing ammonia and carbon dioxide that is a by-product of the synthesis of melamine (page 1, lines 10 to 14). According to example 1, melamine was synthesized at a pressure of 140 Kg/cm^2 (approximately 13,7 MPa). The waste gas at 200°C composed of NH_3 and CO_2 was introduced into an urea synthesizing tower for synthesis of urea at a temperature of 165°C and a pressure of 135 Kg/cm^2 (approximately 13,2 MPa), resulting in an urea synthesis solution (example 1, page 3, lines 108 to 118). After elimination of the excess of ammonia, the urea synthesis solution was introduced into a first ammonium carbamate decomposer in a high pressure urea synthesis step (example 1, page 4, lines 3 to 10; page 3, lines 45 to 59 and 70 to 76). The greater part of the unreacted ammonium carbamate, when heated in the first ammonium carbamate decomposer was decomposed and separated from the urea solution and went to a first condenser (page 3, lines 76 to 83). The first decomposer and first condenser operated at a pressure of 15 to 20 Kg/cm^2 (approximately 1,5 to 2 MPa) (page 3, lines 104 to 106). It is uncontested that the decomposer used in the process according to document (1)

corresponds to the stripper defined in claim 1 of the patent in suit, since the decomposition of ammonium carbamate takes place therein (patent specification, column 5, lines 28 and 29).

4.4 Having regard to this prior art, the Respondent submitted that the technical problem to be solved by the subject-matter of the patent in suit was to provide an integrated process for the preparation of melamine and urea having an improved energy efficiency. This technical problem corresponds to that defined in the specification of the patent in suit (column 3, lines 17 and 18).

4.5 As the solution to this problem the patent in suit proposes the process according to claim 1, which is characterized by the feature that the process is a stripping process in which the decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia is conducted at a pressure which is substantially equal to the pressure in the synthesis reactor. In other terms, since the decomposition of the ammonium carbonate and the expulsion of carbon dioxide and ammonia takes place in the stripper, the claimed solution is characterised in that the urea is produced by a stripping process in which the stripper and the urea reactor are operated at the same pressure.

4.6 The specification of the patent in suit provides two comparative examples which do not truly reflect the closest prior art and which thus cannot demonstrate that the technical problem as defined above has effectively been solved by the claimed process. However,

the Respondent submitted that it was evident for a skilled person that the claimed process provided a successful solution to the problem underlying the patent in suit since it was well known that a stripping process for preparing urea was energetically more efficient than the conventional process disclosed in document (1). This argumentation of the Respondent is supported by the general knowledge in the art as reported by document (10) which mentions that the stripping process accounts for almost half of the world's urea production because of its energy efficiency (page 557, lines 13 and 14). It can thus be concluded that the technical problem defined herein above (see point 4.4) has been successfully solved by the claimed process.

4.7 It remains to be decided whether or not the proposed solution to that objective technical problem, namely the process according to claim 1 of the patent-in-suit, is obvious in view of the state of the art.

4.7.1 The skilled person aiming at improving the process disclosed in document (1) in terms of energy efficiency would turn its attention to document (10) which belongs also to the technical field of production of urea. Document (10) teaches that the stripping process is widely used for producing urea because it is energetically efficient (page 557, lines 13 to 14). Furthermore this document also discloses that in a stripping process, the reactor and the stripper (carbamate decomposer) each operate at the same pressure of 14 MPa (page 557, lines 15 to 16). From this straight teaching in the art the skilled person gets the incentive to modify the process of production

of urea disclosed in document (1) so as to obtain a stripping process in which the reactor and the stripper operate at the same pressure in order to improve the energy efficiency.

The Board concludes from the above that document (10) gives a clear incentive on how to solve the technical problem underlying the patent in suit of improving the energy efficiency of the process known from the closest prior document (1), namely by carrying out the production of urea by using a stripping process in which the reactor and the stripper operate at the same pressure within the claimed range, thereby arriving at the solution proposed by the patent in suit.

For these reasons, the subject matter of claim 1 of the main request turns out to be merely the result of an obvious combination of the teaching of document (1) with that of document (10) and thus lacks inventive ingenuity.

4.7.2 The Respondent argued in support of inventive step that document (10) did not relate to an integrated process for producing melamine and urea, but concerned the production of urea only. Therefore, the skilled person would not consider that document for solving the problem underlying the patent in suit.

However, the Board notes that the closest prior document (1) discloses already an integrated process for producing urea and melamine. When trying to improve the energy consumption of that integrated process, there is no reason which would deter the skilled person from taking into consideration a document which

concerns the production of urea, since the skilled person rather expects that an improvement reached on this specific part of the process will have an impact on the energy consumption of the overall process. Therefore, the Respondent's argument cannot convince the Board.

The Respondent considers as an indication of the presence of inventive step the fact that the combination of a stripping process for preparing urea with a process for preparing melamine under high pressure had never been reported in the art, although both processes individually were well known to the skilled person since at least 30 years before the filing of the patent in suit.

That the combination of both known processes has not been reported in the state of the art over a long period prior to the invention may be an indication that an inventive step is involved if during that time an urgent, but unfulfilled need for improvement has demonstrably existed (see decision T 109/82, OJ EPO, 1984, 473). However, the Respondent did not rely on such a need in its argumentation, nor is the existence of such a need derivable from the available prior art. Moreover, such a secondary indicia for the presence of an inventive step is not a substitute for the objective assessment of inventive step following the problem-solution approach. Secondary indicia are merely subsidiary considerations in the assessment of inventive step helping in doubtful cases where no clear conclusions can be drawn from the analysis of the state of the art but they cannot make an obvious teaching inventive (see decision T 323/99, not published in OJ

EPO, point 4.5.4). In the present case the objective analysis of the prior art according to the problem-solution approach clearly shows that the claimed process is obvious (see point 4.7.1 *supra*) with the consequence that there are no doubts as to the absence of inventive step. Therefore, this argument of the Respondent is devoid of merit.

Finally the Respondent contended that there was no certainty of success to improve the energy consumption of the overall process when using the stripping process as taught in document (10). Hence, the skilled person was prevented from applying such a particular process to the combined production of urea and melamine.

However, when assessing inventive step it is not necessary to establish that the success of an envisaged solution of a technical problem was predictable with certainty. In order to render a solution obvious it is sufficient to establish that the skilled person would have followed the teaching of the prior art with a reasonable expectation of success (see decision T 946/00, not published in OJ EPO). In the present case, the Board cannot agree with the Respondent's argument since the skilled person has a clear incentive from document (10) to use a stripping process in order to minimize the energy consumption (see point 4.7.1 *supra*). Nothing was submitted by the Respondent from which the Board could reasonably conclude that the skilled person has been deterred from following the straight teaching of this document. In the absence of substantiating facts and corroborating evidence he has merely speculated what the Board cannot sanction.

4.8 To summarize, the process according to claim 1 of the main request does not involve an inventive step.

First auxiliary request.

5. *Amendments*

The list of specific regions of the high pressure urea plant incorporated into claim 1 of the first auxiliary request is based on the disclosure at page 15, lines 8 to 14 of the application as filed. Thus, this amendment fulfils the requirements of Article 123(2) EPC.

It was not contested that amended claim 1 does not extend the protection conferred by the patent as granted (Article 123(3) EPC).

6. *Inventive step*

Claim 1 according to the first auxiliary request differs from claim 1 of the main request exclusively in that it comprises the list of the alternative regions of the high pressure urea plant to which the gas stream released from the melamine process is supplied. At the oral proceedings before the Board the Respondent submitted that this amendment was designed for excluding the possibility of supplying the gas stream directly to the urea reactor. However, the Respondent conceded that no particular effect was achieved by that additional feature. In fact, according to the patent in suit the section receiving the off-gas from the melamine plant can be at any locus situated in a high pressure section from the stripper up to and including the urea reactor itself (column 10, lines 46 to 55).

Since, the Board considers, in agreement with the Appellant and the Party as of right, that the skilled person would contemplate any section of the plant as a possible locus for introducing the gas stream, the considerations concerning inventive step given in point 4.7 with respect to the main request are not affected by the indication of a specific section to which the gas stream is supplied. Therefore the conclusions drawn with regard to the main request still apply for the first auxiliary request, i.e. the subject-matter of claim 1 of that request is obvious and does not involve an inventive step.

Second auxiliary request

7. *Admissibility*

7.1 The second auxiliary request was filed at the end of the oral proceedings before the Board. Admission into the proceedings of requests filed at such a late stage of the appeal proceedings is left to the discretion of the Board of Appeal, and is not a matter as of right. For exercising due discretion in respect of the admission of such requests, it is established case law of the Boards of Appeal that crucial criteria are whether or not the amended claims of those requests are clearly allowable and whether or not those amended claims give rise to fresh issues which the other party can reasonably be expected to deal with properly without unjustified procedural delay (see Case Law of the Boards of Appeal of the EPO, 4th Edition 2001, VII.D.14.2.2).

7.2 The second auxiliary request comprises a substantial amendment to claim 1 namely the incorporation of the expression "said" before the second expression "at least one high-pressure section". According to the Respondent, this amendment is designed to specify that the "high pressure section comprising the reactor (A), the stripper (B) and the carbamate condenser (C) whereby decomposition of the ammonium carbamate that has not been converted into urea and the expulsion of carbon dioxide and the usual excess ammonia were conducted at a pressure which was substantially equal to the pressure in the synthesis reactor", is the same as the high pressure section to which the gas stream released from the melamine synthesis is supplied.

That the two expressions "at least one high-pressure section" in claim 1 refer to the identical high pressure section was not defined in the previous requests. According to the Respondent this fresh amendment is based on the combination of the disclosure in the application as filed at page 15, lines 3 to 14 with that at page 6, lines 16 to 22. However, these two sections of the description are not linked to each other, since the section at page 6, lines 16 to 22, defines the general meaning of a stripping plant, whereas the section at page 15, lines 3 to 14, defines the section receiving the gas mixture. Hence the original disclosure is missing that both high-pressure sections indicated in claim 1 refer indeed to the same section. Hence, that amendment to claim 1 represents subject-matter which is not clearly and unambiguously derivable from the content of the application as filed, contrary to the requirements of Article 123(2) EPC.

7.3 Thus, the second auxiliary request is not clearly allowable with the consequence that the Board exercises its discretion not to admit this request into the proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

C. Moser R. Freimuth