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Datasheet for the decision of 10 November 2021

Case Number: T 2646/17 - 3.3.05

Application Number: 10741934.3

Publication Number: 2464601

IPC: C01C1/04, C01B3/02

Language of the proceedings: EN

Title of invention:
PROCESS FOR REVAMPING AN AMMONIA PLANT WITH NITROGEN-BASED WASHING OF A PURGE STREAM

Patent Proprietor:
CASALE SA

Opponent:
L'AIR LIQUIDE, SOCIETE ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE

Headword:
ammonia process/CASALE

Relevant legal provisions:
EPC Art. 54(1), 54(2), 54(3), 56, 87(1), 123(1)
RPBA Art. 12(4)
RPBA 2020 Art. 11, 13(2)

Keyword:
Late-filed evidence - submitted with the statement of grounds of appeal - admitted (yes)
Priority - (yes)
Amendments - allowable (yes)
Novelty - main request (yes)
Inventive step - main request (yes) - ex post facto analysis - non-obvious combination of known features
Late-filed facts - submitted during oral proceedings - admitted (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Office européen des brevets

Beschwerdekammern

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Case Number: T 2646/17 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 10 November 2021

Appellant: (Opponent)	L'AIR LIQUIDE, SOCIETE ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE 75 Quai d'Orsay 75007 Paris (FR)
Representative:	Air Liquide L'Air Liquide S.A. Direction de la Propriété Intellectuelle 75, Quai d'Orsay 75321 Paris Cedex 07 (FR)
Respondent: (Patent Proprietor)	CASALE SA Via Giulio Pocobelli 6 6900 Lugano (CH)
Representative:	M. Zardi & Co S.A. Via G. B. Pioda, 6 6900 Lugano (CH)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 5 October 2017 rejecting the opposition filed against European patent No. 2464601 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	P. Guntz

Summary of Facts and Submissions

I. The opponent's (appellant's) appeal lies from the opposition division's decision to reject the opposition against European patent EP-B-2 464 601.

II. The following documents were among those discussed at the opposition stage:

P1 EP 2 284 125 A1

D1 K. Aika *et al.*, "Ammonia, Catalysis and Manufacture", Chapter 6 "Ammonia Production Processes", Berlin, Heidelberg, Springer Verlag, 1995, 202-304

D2 US 4,479,925 A

D3 US 4,548,618 A

D4 US 5,736,116 A

D5 J.E. Arregger, "Production and Purification of Argon", Chemical and Process Engineering, October 1964, 549-554

D6 US 2004/0234426 A1

D7 W.H. Isalski, "Separation of gases", section 4 "Rare gas recovery", Clarendon Press, Oxford, 1989, 81-101 and 137-183

D8 FR 1274934 A

D9 US 5,180,570 A

D10 H. Springmann, "Methods for argon recovery to meet increased demand on the argon market", Cryogenic Processes and Equipment, 224(79), 1982, 12-17

D11 US 2,865,864 A

D12 H.W. Häring, "Industrial Gases Processing", Wiley-VCH, Weinheim, 2008, 1-296

D13 US 4,338,108 A

III. With its statement setting out the grounds of appeal, the appellant further submitted the following documents:

D14 H. Gunardson, "Industrial Gases in Petrochemical Processing", New York, Basel, Marcel Dekker, Inc., 1998, 40-69

D15 B. Metz *et al.*, "IPCC Special Report on Carbon Dioxide Capture and Storage", Cambridge University Press, 2005, 111-14 and 130-32

IV. The independent claims of the patent in suit read as follows:

"1. A process for producing ammonia, where: a make-up syngas (6) is produced by steam reforming of a hydrocarbon source (5), the steam reforming comprising steps of primary reforming and secondary reforming, and further treatment steps of shift, CO_2 removal and methanation; the make-up syngas is compressed and reacted in a high-pressure synthesis loop (2) to produce ammonia; an air feed (17) is subject to a separation process into an oxygen stream (9) and at least one nitrogen stream (10, 16); said oxygen stream provides additional oxidizer to said secondary reforming, the process being characterized in that: a purge gas stream (7), which is a purge gas purged from said synthesis loop (2) or a tail gas coming from a purge gas recovery section (160), and which contains inerts, is contacted with a nitrogen stream (10) obtained from said air separation process, said

nitrogen stream being in a liquid state, or a mixture of liquid and gaseous nitrogen, obtaining a hydrogen-containing and substantially inert-free recycle gas stream (8), and said recycle gas stream (8) is recycled to the synthesis loop,
in that said purge gas stream (7) is contacted with said nitrogen stream at a cryogenic temperature, and in that upon contacting with the nitrogen stream, at least a part of said purge gas (7) is liquefied producing a methane-rich liquid stream (107) and separating a recycle gas stream (108) containing mainly hydrogen and nitrogen."

"6. An ammonia plant comprising an ammonia synthesis loop (2) and a front-end (1) for providing a make-up syngas to said synthesis loop, said front end comprising a primary reformer, a secondary reformer, and further equipments for shift, CO_2 removal and methanation, and a main syngas compressor for feeding said make-up syngas to the synthesis loop, the plant further comprising at least one air separation unit (3) providing an oxygen stream (9) and at least one nitrogen stream, and a flow line feeding said oxygen stream to the secondary reformer or to an air compressor feeding said secondary reformer, characterized by comprising:
- a purge recovery unit (4) comprising at least a cryogenic washing device for washing at a cryogenic temperature of a purge gas (7) containing inerts purged from said synthesis loop, or a tail gas coming from a purge gas recovery section, with a nitrogen stream (10) generated from said air separation unit (3), to obtain a substantially inert-free recycle stream (8), said nitrogen stream being in a liquid state, or a mixture of liquid and gaseous nitrogen, and

- a flow line disposed to feed said recycle stream (8) to the synthesis loop."

"9. A process for revamping an ammonia plant, where:
- the plant comprises an ammonia synthesis loop (2) and a front-end (1) for providing a syngas stream comprising hydrogen and nitrogen to said synthesis loop, the front-end comprising a primary reformer, a secondary reformer, and further equipments for shift, CO_2 removal and methanation, and a syngas compressor (11) for feeding said syngas stream to the synthesis loop,
and the revamping process comprises the steps of:
- installing an air separation unit (3) adapted to provide an oxygen stream (9) and at least one liquid or gaseous nitrogen stream (10, 16);
- feeding said oxygen stream (9) to the secondary reformer, or to an air compressor feeding the secondary reformer;
- providing a purge recovery unit (4) where a nitrogen stream (10) generated from said air separation unit (3) is used for washing at a cryogenic temperature a purge gas (7) taken from the synthesis loop, or a tail gas released from treatment of a purge gas, said nitrogen stream being in a liquid state, or a mixture of liquid and gaseous nitrogen, so obtaining a substantially inert-free recycle stream (8), and feeding said recycle stream to the synthesis loop."

Dependent claims 2 to 5, 7, 8, 10 and 11 refer to preferred embodiments.

V. The appellant's arguments are summarised as follows:

The priority of claims 1 and 5 of the contested patent was not valid. The priority document P1 was therefore a document relevant under Article 54(3) EPC.

Claims 1 and 5 of the patent in suit did not meet the requirements of Article 123(2) EPC.

The claims of the patent in suit as granted (main request) did not meet the requirements of Article 54 EPC in view of each of P1 and D1.

The independent claims of the main request did not meet the requirements of Article 56 EPC in view of each of:
- D1 as closest prior art, at least when combined with one or more of documents D3 to D12, D14 and D15,
- D6 as closest prior art, at least when combined with one or more of documents D1, D3, D5, D7, D8, D10 to D13 and D15,
- D2 as closest prior art, at least when combined with one or more of documents D1, D4, D6, D7, D9 and D12, and
- D9 as closest prior art.

In this regard, the missing features were all known and related to partial problems.

VI. The respondent's (patent proprietor's) arguments are summarised as follows:

Documents D14 and D15 were not to be considered, otherwise the case should be remitted to the department of first instance.

The priority of the patent in suit was valid. In the technical context of the case at hand, the terms "contacting" and "treating" had the same technical

meaning, in particular since treating implied contacting.

The patent as granted also met the requirements of Article 123(2) EPC, in particular since claim 1 as granted had its basis, *inter alia*, in the first and last paragraphs on page 4 of the application as originally filed.

As the priority of the patent in suit was valid, P1 was not a document under Article 54(3) EPC.

D1 failed at least to disclose providing additional oxidiser to the secondary reformer (Article 54(1) and (2) EPC).

Moreover, D1, D6 and D2 failed to disclose the combination of several features of the independent claims. The inventive-step objections were therefore based on an *ex post facto* analysis of the invention. D6 and D2 were more remote from the invention than D1.

The inventive-step objection starting from D9, raised at the oral proceedings at the appeal stage, was late and should not be considered.

For these reasons, the main request met the requirements of the EPC.

VII. The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent requested that the appeal be dismissed. In the alternative, it requested that the patent be maintained as amended on the basis of one of three

auxiliary requests as filed with its submission dated 14 July 2017.

Reasons for the Decision

Main request (patent as granted)

1. Admissibility/consideration of documents

The respondent requests that documents D14 and D15 not be considered.

D14 and D15 were submitted with the statement setting out the grounds of appeal. These documents relate to the common general knowledge of the skilled person at the priority date and are taken into consideration under Article 12(4) RPBA 2007, in line with established case law (see Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, V.A.4.13.1 c)).

The respondent has indicated no reasons justifying remittal of the case to the department of first instance, and the board cannot see any either. The request for remittal is therefore rejected (Article 11 RPBA 2020).

2. Priority

For the following reasons, the opposition division's finding that the priority of the patent in suit is valid is correct (Article 87(1) EPC).

2.1 In the appellant's view, the use of the term "contacted/contacting" in claim 1 of the patent in suit and the use of the term "treated/treating" in claims 1 and 4 as well as in paragraphs [0015] and [0020] of the published priority document P1 (corresponding to page 4, first paragraph and page 5, second full paragraph of the priority document as originally filed) resulted in different inventions. Compared with "treating", "contacting" also encompassed indirect contact, e.g. in a heat exchanger. For this reason, the priority of the subject-matter of claim 5 of the patent in suit was invalid too.

The appellant also argued that the limitation to at least partially liquid nitrogen for contacting without at the same time indicating that the contacting is carried out by counter-current washing was a multiple selection.

2.2 In the technical context of the case at hand, however, the terms "contacting" and "treating" have the same meaning. Indeed, it is specified in both claim 1 of the patent in suit and in claim 4 of P1 that the contacting/treating is carried out at cryogenic temperature and results in partial liquefaction of the purge gas, thus yielding a methane-rich liquid stream and a recycle gas stream containing mainly hydrogen and nitrogen. There is no reason why "contacting" should encompass indirect contact whereas "treating" should not.

The at least partially liquid state of nitrogen for contacting is the result of the allowable deletion of the gaseous nitrogen alternative, e.g. in paragraph [0018] of P1 (corresponding to the paragraph bridging pages 4/5 of the priority document as originally

filed). This passage too is not restricted to counter-current washing, which is presented as a more preferred form of contacting in paragraph [0021] (corresponding to the paragraph bridging pages 5/6 of the priority document as originally filed).

3. Amendments

For the following reasons, the opposition division was also correct in concluding that the patent in suit meets the requirements of Article 123(2) EPC.

3.1 In the appellant's view, the use of the term "contacted/contacting" in claim 1 of the patent in suit went beyond the original disclosure since page 4, line 9 of the application as originally filed merely disclosed the term "treating".

Moreover, the application as originally filed disclosed a cryogenic temperature together with an at least partially liquid nitrogen stream only in combination with a counter-current washing step.

3.2 For analogous reasons to those above under point 2., however, the feature "contacting" - thereby yielding a methane-rich liquid stream and a hydrogen and nitrogen-rich recycle stream - *in combination* with the at least partially liquid nature of the nitrogen stream from the air separation process (in the following ASU for air separation unit) in claim 1 of the patent in suit has a basis on page 4, first and last paragraphs, of the application as originally filed.

The at least partially liquid state of nitrogen for contacting is the result of the allowable deletion of

the gaseous nitrogen alternative, e.g. on page 4, lines 24/25 of the application as originally filed.

Furthermore, the fact that an air separation process is used and that the resulting streams are at least partially in a liquid state implies the presence of a cryogenic temperature.

The above-mentioned passages on page 4 of the application as originally filed are not limited to counter-current washing either.

3.3 Consequently, claim 1 as granted does not go beyond the disclosure of claims 1 to 4 and page 4, lines 1 to 11 and 24 to 25, of the application as originally filed.

Similarly, claims 6 and 9 as granted are based on claims 9 and 12 as originally filed, respectively, in combination with page 4, lines 1 to 11 and 24 to 25, of the application as originally filed.

Dependent claims 2 to 5, 7, 8, 10 and 11 as granted have their basis in claims 5 to 8, 10, 11, 13 and 14 as originally filed, respectively.

The opposition division was therefore correct in concluding that the patent in suit meets the requirements of Article 123(2) EPC.

4. Novelty

For the following reasons, the main request also meets the requirements of Article 54(1) and (2) EPC.

4.1 Since the priority of the patent in suit is valid (see point 2.), the priority document **P1** is not prior art within the meaning of Article 54(3) EPC.

4.2 With regard to **D1**, at least the feature "said oxygen stream [i.e. the oxygen stream from the ASU] provides additional oxidizer to said secondary reforming" of claim 1 of the patent in suit is not directly and unambiguously disclosed in D1.

Indeed, while section 6.3.5.2 (on page 217, last paragraph of this chapter) discloses an air separation unit, the oxygen formed is sent to a gasification or partial oxidation process, not to a secondary reforming step.

Any reference to the common general knowledge is rather a question of inventive step.

The subject-matter of claim 1 is hence novel over D1 (Article 54(1) and (2) EPC).

4.3 Likewise, D1 does not disclose the features
- "a flow line feeding said oxygen stream to the secondary reformer or to an air compressor feeding said secondary reformer" of claim 6, and
- "feeding said oxygen stream (9) to the secondary reformer, or to an air compressor feeding the secondary reformer" of claim 9.

The subject-matter of independent claims 6 and 9 is therefore novel too (Article 54(1) and (2) EPC).

4.4 These findings also apply to the dependent claims.

5. Inventive step

For the following reasons, the patent as granted also meets the requirements of Article 56 EPC.

Claim 1 relates to a process for producing ammonia.

5.1 D1 as closest prior art

5.1.1 It is not contested that D1 is suitable as closest prior art.

D1 is a textbook dealing in various chapters with aspects of the production of ammonia and, as shown below, discloses several features in common with the subject-matter of claim 1 of the patent in suit.

(1) Starting from the expression "[t]he synthesis gas produced by *any* of the methods described in section 6.3" in section "6.4.7 Purge Gas Recovery" (page 254), it is, firstly, possible to select the second column from the left in Figure 6.1 (pages 206 and 207) with the steps "Primary Reforming", "Secondary Reforming", "Shift Conversion", "CO_2 Removal" and "Methanation" from several alternatives.

According to the second paragraph of section 6.4.7, a purge gas is indeed present in this case, since there is no "liquid nitrogen wash for final purification" of the synthesis gas.

(2) It is then possible to choose "6.4.7.1 Cryogenic Separation" (pages 255 and 256) from several alternatives when choosing the type of purge gas recovery.

In this case, a cryogenic unit "similar" to the ones used for purifying the synthesis gas may be used for the purge gas recovery, namely a unit where the purge gas is "cooled to partial condensation in a heat exchanger" (pages 255/256). The fact that a purge gas separation process *similar* to the processes of the cryogenic synthesis gas purification methods of section 6.3.5.2 on pages 216 and 217 may be used, and that this process is subsequently explained in more detail, proves that there is no direct and unambiguous reference to the precise cryogenic methods disclosed in section 6.3.5.2 with regard to the purification of the synthesis gas.

5.1.2 According to the patent in suit, the problem to be solved is to provide a process for producing ammonia with an increased capacity (e.g. paragraph [0041]).

5.1.3 It is suggested to solve this problem by the process of claim 1 characterized in an integrated process involving, *in combination*:
- a front-end comprising, *inter alia*, primary and secondary reforming,
- NH_3 synthesis with formation of a purge gas,
- liquefaction of a part of the purge gas by at least partially liquid N_2 from an ASU, and
- the provision of additional O_2 from the ASU to the secondary reforming.

5.1.4 It is uncontested that the problem posed is successfully solved.

5.1.5 For the following reasons it is not obvious to arrive at the subject-matter of claim 1 when starting from D1:

(a) As shown above under point 5.1.1, a multiple selection is necessary to arrive at:
- synthesis gas production involving primary and secondary reforming, and
- cryogenic separation of the purge gas.

There is no indication in D1 that these specific selections contribute to solving the technical problem.

(b) Nor is there any indication in D1 to use an air separation unit in combination with the claimed synthesis gas production by means of primary and secondary reforming.

The sequence of primary and secondary reforming in Figure 6.1 on page 206 is only disclosed in combination with the use of "Air".

Alternatives using "Enriched Air", "N2" and/or O2" in D1 are mentioned, but involve different synthesis-gas production processes.

- The use of "Enriched Air" is disclosed on the upper left side of Figure 6.1 or on the top of the continuation of Figure 6.1 on page 207 (see also last complete paragraph on page 208 in this regard), but in combination with "Autothermal Reforming" and "Partial Oxidation, Gasification" for producing the synthesis gas. While "Autothermal Reforming" may be construed as a specific type of secondary reforming, the primary reforming of claim 1 also claimed is missing in this alternative.

- Similarly, Figure 6.1 discloses on page 207 an alternative with the use of pure nitrogen and

oxygen (N_2 and O_2), namely a process scheme involving "Partial Oxidation, Gasification" followed by a "Nitrogen Wash" of the resulting synthesis gas.

- The last paragraph of section 6.3.5.2 on page 217 also mentions an ASU only in combination with synthesis-gas production by "gasification or partial oxidation".

The situation in D1 therefore amounts to "teaching away" from the invention: should the skilled person contemplate the use of oxygen and nitrogen from an ASU, they would not use the claimed sequence of primary and secondary reforming to produce the synthesis gas.

(c) The appellant moreover hints at various combination documents that would render obvious specific isolated aspects of the subject-matter of claim 1.

However, claim 1 is directed to a complex process flowsheet comprising the steps: synthesis gas production, NH_3 synthesis, gas recovery from the purge of the NH_3 synthesis and air separation.

The claimed process is not merely a sequence of these process steps but an *integrated* process with, in particular:
- a recycle gas stream from the partial liquefaction of the purge back to the NH_3 synthesis, and
- the use of the ASU products for both the contacting of the purge gas from the NH_3 synthesis loop and the secondary reforming step of the synthesis gas production.

The fact that this interplay of process steps allows for an increase in the capacity of the overall process proves the presence of a combination invention and not merely of an aggregation of process steps (Case Law, I.D.9.2.1).

With regard to the various combination documents, the board moreover notes the following:

- Each of documents D4 (Figure 2 (118, 120, 112)), D6 (Fig. 3 (stream "Oxygen from ASU" to "Secondary Reformer")), D9 (Fig. 1 (26, 22, 14, 34)), D14 (Figure 11 on page 67) and D15 (first paragraph of the right-hand column on page 113) discloses the use of O_2, possibly from an ASU, in a secondary reforming step, but they do not disclose the simultaneous use of liquid nitrogen from the ASU to contact the purge gas of an NH_3 synthesis loop.

- While D3 (Figure 2 (51)) discloses the use of liquid N_2 from an ASU for liquefying part of a purge gas of an NH_3 synthesis loop (Figure 2 (51)), the passage in column 6, lines 14 to 21 clarifies that this is only necessary if liquid Ar is to be removed. However, the technical problem to be solved is not related to Ar. Moreover, D3 is silent on the use of O_2 from an ASU in a secondary reforming step.

- Each one of documents D5 (Figure 5 (stream "Liquid Nitrogen")), D7 (Figure 4.5) or D13 (figure (37, 79, 11, 13, 17)) discloses contacting of the purge gas of an NH_3 synthesis loop with liquid N_2. However, the liquid N_2 in these documents does not

stem from an ASU. Moreover, no O_2 from the ASU is sent to a secondary reforming step.

- Each one of documents D8 (figure (6, 41, 39)), D9 (Figure 1 (26, 28, 72)), D10 (Figure 5), D11 (figure (6, 41, 39)) or D12 (pages 13, 15, 38) discloses the use of liquid N_2, possibly from an ASU, but at most for purifying a synthesis gas (and not the purge gas of an NH_3 synthesis loop). Moreover, only in D9 is O_2 sentfrom an ASU to a secondary reforming step (Figure 1 (26, 22, 14, 34)).

In other words, the appellant seeks to establish a combination between different passages of document D1 (see points 5.1.1 and (a)) and one or more further documents (see point (c) above) to arrive at the claimed subject-matter. Such "mosaicking" however amounts to a hindsight consideration, in particular in such a case of a highly integrated process involving the use of recycle streams.

Consequently, the subject-matter of claim 1 involves an inventive step in view of D1 as closest prior art (Article 56 EPC).

5.1.6 The appellant argues that the use of additional O_2 increases the capacity, whereas the use of N_2 for contacting increases the efficiency of the process. These features would merely address independent partial problems that could be solved by routine optimisation.

However, both O_2 and N_2 are produced in the ASU. Moreover, more O_2 results in more synthesis gas being produced, which in turn necessitates more N_2 for producing ammonia, due to the reaction's stoichiometry.

This proves that the related effects are interrelated and must not be considered separately.

5.2 D6 as closest prior art

In the appellant's view, D6 is also a suitable starting point for assessing inventive step.

5.2.1 Figure 3 of D6 discloses an integrated overall flowsheet for producing ammonia comprising:
- synthesis gas production by primary and secondary reforming
- an NH_3 synthesis loop with a purge
- an ASU which sends O_2 to a secondary reforming step
- a recycle gas stream (stream between "Fluor Coldbox" and "Syngas Compression".

An increase in the capacity is also addressed (paragraph [0022]).

Since D6 discloses a process with the same purpose and has several features in common with the subject-matter of claim 1, this document is also a suitable starting point for assessing inventive step.

5.2.2 However, while claim 1 requires partially liquefying the purge of the NH_3 synthesis loop with at least partially liquid N_2 from an ASU, the purge of the NH_3 synthesis loop in D6 is cooled in a coldbox (Figure 3, "Purge", "Fluor Coldbox"). According to the details of a preferred coldbox in Figure 4, it involves the use of nitrogen from an independent closed refrigeration circuit, and not from an ASU (paragraph [0030]).

While N_2 from an ASU is also used in the process of D6 (Figure 3 (308)), it is in a *gaseous* state (paragraph [0026]) and moreover contacts the make-up synthesis gas upstream of the methanator (paragraph [0026]).

5.2.3 It has not been contested that the technical problem of providing a more efficient process is successfully solved.

However, the appellant has given no indication in the available prior art, and in particular not in documents D1, D3, D5, D7, D8, D10 to D13 or D15, to replace the coldbox with the external N_2 cooling circuit of D6 by a *combination* of:

- cooling of the purge from the NH_3 synthesis loop
- by means of liquid N_2
- which stems from an ASU

and that this would solve the technical problem posed. The board could not identify such an indication either.

In this context, the board notes that the use of liquid N_2 from an ASU in D3 (column 6, lines 14 to 21) is only necessary in the event that liquid Ar is to be recovered, which is not the problem to be solved.

Consequently, the subject-matter of claim 1 of the patent in suit involves an inventive step when starting from D6 as closest prior art as well (Article 56 EPC).

5.3 D2 as closest prior art

Since D2 (see in particular the figure) fails to disclose an ASU, let alone the use of O_2 or N_2 from such an ASU, in the process for producing NH_3, D2 is

more remote from the invention than D1 or D6. D2 is thus not suitable as closest prior art.

6. D9 as closest prior art

At the oral proceedings at the appeal stage, the appellant raised for the first time in the appeal procedure an inventive-step objection starting from D9 as closest prior art.

Such an objection is not part of the decision under appeal and the appellant has submitted no reasons as to why this objection was only raised at this late stage.

In the absence of any cogent reasons for this amendment of the appellant's case and of any exceptional circumstances this objection is not considered (Article 13(2) RPBA 2020).

The question of its consideration notwithstanding, it appears that this objection would not have been successful anyway. As explained above under point (c), D9 discloses in the figure the use of liquid N_2 (28) from an ASU (26), but for washing (72) the synthesis gas and not the purge gas of an NH_3 synthesis loop, which can be equated to "recycle gas 85". Hence the skilled person would have needed to contact this "recycle gas" with liquid nitrogen from the ASU 26 for its partial liquefaction. There is however no indication in this regard.

7. Since the remaining claims of the patent in suit also require synthesis gas production involving primary and secondary reforming, an NH_3 synthesis loop and an ASU

wherein liquid N_2 from the ASU is used to contact the purge gas from the NH_3 synthesis loop and wherein O_2 from the ASU is provided to the secondary reforming, the reasoning of points 5.1, 5.2 and 5.3 above applies to the remaining claims as well.

Consequently, the subject-matter of the remaining claims also involves an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated