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Datasheet for the decision of 23 October 2025

Case Number: T 1234/23 - 3.3.06

Application Number: 14701595.2

Publication Number: 2954029

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Language of the proceedings: EN

Title of invention:
REACTOR AND REACTION METHOD FOR REACTING CARBON MONOXIDE AND HYDROGEN IN THE PRESENCE OF A CARRIER LIQUID TO FORM A HYDROCARBON PRODUCT

Applicant:
Siemens Industry Software Limited

Headword:
Siemens/reactor

Relevant legal provisions:
EPC Art. 123(2)
RPBA 2020 Art. 12(4), 12(6)

Keyword:
Amendments - extension beyond the content of the application as filed (yes) - intermediate generalisation
Amendment to case - amendment overcomes objection (no) - amendment admitted (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Case Number: T 1234/23 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 23 October 2025

Appellant: (Applicant)	Siemens Industry Software Limited Pinehurst 2, Pinehurst Road Farnborough GU14 7BF (GB)
Representative:	Siemens Patent Attorneys Postfach 22 16 34 80506 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 January 2023 refusing European patent application No. 14701595.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairwoman	J. Hoppe
Members:	S. Arrojo
	R. Elsässer

Summary of Facts and Submissions

I. The appeal is directed against the decision of the examining division to **refuse European patent application No. 14 701 595.2** for non-compliance with the requirements of Article 123(2) EPC.

II. With their statement of grounds of appeal, the applicant and appellant requested that the impugned decision be set aside and a patent be granted on the basis of the main request or, as an auxiliary measure, on the basis of one of auxiliary requests 1 to 3 filed therewith.

III. In a communication under Article 15(1) RPBA, the board expressed its preliminary opinion that none of the requests on file appeared to meet the requirements of Article 123(2) EPC.

IV. At the oral proceedings, which took place on 23 October 2025, the appellant confirmed its requests as set out in the statement of grounds of appeal.

Reasons for the Decision

1. Main request - Article 123(2) EPC

1.1 The subject-matter of claim 1 according to the main request is based on claim 1 as filed with the following amendments highlighted by the board:

"1. A method of forming a hydrocarbon product~~,~~ using a Fischer-Tropsch process in a reactor (200) having a cylindrical tank body (230) containing a sump (234), a wax channel (226) and a gas channel (212), the method comprising:
a first step, in a first gas enrichment zone (206) of the reactor (200), of enriching, using a syngas containing carbon monoxide and hydrogen, a carrier material that is in liquid ~~with~~ form at the operating temperature of the reactor (200) and that is capable of absorbing carbon monoxide and hydrogen, wherein the carrier liquid is a wax including C5 – C100 hydrocarbons; and
a subsequent step of bringing the enriched carrier liquid into contact with a catalyst in a separate first reaction zone (216) of the ~~a~~ reactor (200), wherein the hydrogen and carbon monoxide enriched carrier liquid forms a layer of liquid wax situated on top of the reaction zone (216) and passes through the reaction zone (216);
after passing through the first reaction zone (216), the liquid wax passes through two further gas enrichment and reaction zones before it is pumped from the sump (234) up the wax channel (226) by a pump (204) to the top of the first gas enrichment zone (206);
wherein water and low-boiling hydrocarbons are desorbed in the gas enrichment zones (206);
wherein the, or each, gas enrichment zone (206) comprises structured packing material that the liquid wax, hydrogen, and carbon monoxide pass through;
wherein the syngas passes between a gas inlet provided by an aperture (228) in the gas channel (226) and an outlet (224) such that the syngas follows a path through the liquid wax in the structured packing to form the hydrogen and carbon monoxide enriched wax;

wherein the gas stream between the aperture (228) and the gas outlet (224) intersects the direction of wax flow;
wherein the wax channel (226) and the gas channel (212) are concentric, and an annular ring (214) is inserted around the wax (226) and gas (212) channels and into the gas enrichment zone (206) and an annular plate (218) is inserted into the reaction zone (216); and
wherein the catalyst catalyses reaction of the carbon monoxide and hydrogen to form the hydrocarbon product."

1.2 The underlined amendments to claim 1 as filed are, according to the appellant, based on the following passages of the description as filed:

i) Syngas containing carbon monoxide and hydrogen (page 7, lines 27-28);
ii) Carrier material in liquid form at the operating temperature of the reactor, capable of absorbing carbon monoxide and hydrogen (page 6, lines 24-25) and being a wax with C5-C100 (page 7 lines 5-7);
iii) Hydrocarbons formed using a Fischer-Tropsch process (page 6, line 23 - page 7, lines 12-13);
iv) Wax moves through reaction zone (page 9, lines 1-3);
v) Water and low-boiling hydrocarbons are desorbed in the gas enrichment zones (page 10, lines 16-18);
vi) Forming enriched wax (page 8, lines 21-23);
vii) Tank, sump and gas channels (page 7, lines 12-21);
viii) Two further reaction and enrichment zones;
ix) Concentric wax channel and gas channel;
x) Annular ring inserted in gas enrichment zone and annular plate inserted in reaction zone (page 13, lines 6-10).

1.3 In the impugned decision, the examining division held that the amended claim constituted an unallowable intermediate generalisation, as it selectively incorporated certain features from the detailed description while omitting others.

1.4 The appellant contested this finding, arguing that the inclusion of certain features and the omission of others were supported by the application as filed:

1.4.1 Firstly, the appellant argued that each of the newly added features in claim 1 was clearly and unambiguously derivable from the application as filed and was not inextricably linked to the omitted features. They contested that the combination of features taken from different figures as filed was permissible, as they all related to the same embodiment.

1.4.2 While the appellant acknowledged that some of the features in the description as filed had been omitted in the subject-matter of claim 1, this was justified, because the features in question were explicitly presented as optional (using expressions such as "may include" or "may be"), and thus merely represented design choices and/or non-essential aspects of the invention. This reasoning applied in particular to all of the omitted features identified by the board in its preliminary opinion.

1.4.3 The appellant further emphasised that the only relevant test for assessing compliance with Article 123(2) EPC was the 'gold standard', and that they had provided convincing reasons why the features incorporated into claim 1 were not inextricably linked with the omitted features. By contrast, in its preliminary opinion the board had not identified any omitted feature that could

be regarded as inextricably linked to those defined in claim 1.

1.4.4 To illustrate the above arguments, the appellant referred to the definition of a pump in claim 1 while omitting the specific type of pump used. Although the description as filed disclosed a particular type of pump (namely a "propeller booster pump"), this omission was, in the appellant's view, clearly allowable, since the skilled person would understand that the essential function of the pump was merely to propel the liquid, and that the specific pump type constituted an optional design feature that could be omitted. During the oral proceedings, the appellant also disputed that the particular configuration of the reaction zone, the gas and wax channels, and the annular plate as depicted in the figures (in particular Figures 2A and 2B) and described on page 7 ff. of the application as filed, was functionally linked to the features included in the claims of the respective requests.

1.5 The board agrees that the standard to be applied when assessing compliance with Article 123(2) EPC is the gold standard (G 2/10, Reasons 4.3). The question to be answered is therefore what the skilled person, using common general knowledge and taking an objective view at the filing date, would derive directly and unambiguously from the application documents as originally filed in their entirety. However, the board is not convinced by the appellant's arguments in the present case. In particular, as explained in more detail in the next point, when the claimed subject-matter is compared with the disclosure of the application as filed, essential structural and functional relationships are omitted or modified in a manner that is not directly and unambiguously

disclosed. Accordingly, applying the gold standard leads to the conclusion that the subject-matter of claim 1 is not derivable from the application as originally filed.

1.6 Where a claim is amended by selecting only some, but not all, of the features disclosed in an embodiment of the application as filed that is relied upon as the basis for the amendment, the resulting subject-matter constitutes an intermediate generalisation. For such an amendment to be allowable, the selected subject-matter — i.e. the features retained in the claim without the omitted features — must be directly and unambiguously derivable from the application as originally filed in accordance with the gold standard. This requirement is not met for the subject-matter of claim 1 of the main request for the following reasons:

1.6.1 From a general standpoint, and as set out in detail in the preliminary opinion, in the present case the unallowable intermediate generalisation arises from amending claim 1 by combining its broad original wording with selected features extracted from a specific embodiment illustrated in the figures and disclosed in the description of the application as originally filed, which is relied upon as the basis for the amendments. Although many of the omitted features are explicitly described as optional, the distinction between optional and non-optional features provides no meaningful guidance in the present case, given the large number of features characterised as optional in the description and, in particular, the fact that several features of the relied-upon embodiment that are not presented as optional have nevertheless been omitted from the subject-matter of claim 1. In other words, there is no coherence between the stated

optionality of features and those retained or omitted in claim 1, since the claim includes some optional features while omitting others that are not described as optional. Consequently, the selection of features added to or omitted from claim 1 appears to be made on an arbitrary basis. For this reason, an embodiment incorporating the selected features of claim 1 while omitting others is not directly and unambiguously derivable from the application as originally filed for the skilled person.

1.6.2 For instance, the features referred to in point 1.2 i), ii), iii) and vii) (see above) are defined in claim 1, despite being presented in the application as filed as optional or as merely one among several alternatives. Conversely, other features that are not presented as optional in the description as filed have been omitted. For example, while claim 1 defines the concentric channel configuration described on page 7, line 24, and illustrated in Figure 2, it omits the additional features disclosed on page 7, lines 22–23 (i.e. "Syngas is introduced to the reactor from gas inlet 208 and is directed by gas-directing plates 210 towards gas channel 212."), even though these form part of the same channel configuration of the relevant embodiment and are not described as optional. Numerous other features disclosed in the application as filed, which are likewise not presented as optional, are also absent from claim 1 — for instance, those relating to the reaction zone 216 (see page 8, line 30 to page 9, line 10).

1.6.3 This problem is compounded by the fact that many of the passages cited as a basis do not provide a stand-alone disclosure, as they relate to the embodiment illustrated in the drawings and are therefore

inherently linked to the specific and detailed features shown therein. Consequently, even where claim 1 uses wording identical to that of these passages, additional features that would be directly and unambiguously derivable from the drawings described in those passages are omitted from the subject-matter of claim 1.

1.6.4 This situation is illustrated, for example, by the description of the configuration of the wax and gas channels. Claim 1 defines their concentric arrangement, as well as the insertion of the section of structured packing 214 and the annular plate 218 around these tubes (see page 7, lines 23–24; page 13, lines 6–8; Figure 2; and Figures 4A and 4B). While the wording of these features may be regarded as literally supported by the explicit disclosure, it does not capture several aspects that are directly and unambiguously derivable from the described embodiment as shown in the figures. For instance, since claim 1 does not specify, either explicitly or implicitly, that the wax and gas channels are disposed adjacently, it encompasses configurations including additional intermediate (concentric) channels, which clearly extends the subject-matter beyond the embodiment relied upon in the application as filed. Moreover, the wording of claim 1 also covers methods in which the gas circulates through the inner channel and the wax through the outer channel — an alternative that likewise extends beyond the embodiment illustrated in Figure 2.

1.6.5 As regards the argument that the omitted features are not inextricably linked to those defined in claim 1, the board notes that a feature that is indeed essential or inextricably linked to the claimed subject-matter can generally not be omitted without infringing Article 123(2) EPC (Case Law of the Boards of Appeal, 11th

edition, II.E.1.4.3). However, the reverse does not hold: if a feature is not essential, this finding alone does not allow the conclusion that it can be omitted without infringing Article 123(2) EPC (Case Law of the Boards of Appeal, 11th edition, II.E.1.4.4). Rather, it needs to be assessed whether the claimed subject-matter - without the omitted feature - was already disclosed by the application as filed according to the gold standard, i.e. whether the skilled person would derive it directly and unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole of the documents as originally filed. For this assessment the common general knowledge cannot serve to complement or replace the actual content of the application as originally filed. Hence, assessing the original disclosure must not turn into an investigation of obviousness or a search for obvious alternatives of the actual disclosure in the light of common general knowledge (Case Law of the boards of Appeal, 11th edition, II.E. 1.3.4.a).

1.6.6 If an omitted feature is structurally or functionally linked to the features defined in the claim, and if the original disclosure provides no teaching or indication that the feature could be omitted or has no technical relevance for the embodiment relied upon as the basis for the claimed subject-matter, the feature can usually not be omitted, irrespective of whether it is essential or not.

1.6.7 As discussed at the oral proceedings, in particular, the specific configuration of the wax and gas channels (e.g., the concentric arrangement of the wax and gas channels and the plates 210 to guide the gas), the pump 204 used to circulate the wax, and the reaction zone as

illustrated in the figures and described in the application as filed, provide a combined functional contribution to the claimed method. This configuration is not merely a design option but serves to direct the gas and wax to the intended zones formed by the embodiment relied upon, thereby enabling an efficient reaction with the advantages and effects referred to in the application as filed. The arrangement of the reaction zone remaining covered by wax layers ensures that little or no unabsorbed hydrogen and carbon monoxide reach the catalyst (page 9, lines 24 ff. of the application as filed). The annular plate forms a substrate supporting the catalyst held in the porous cartridges (page 9, lines 3 ff. of the application as filed). Moreover, the location and specific type of pump, together with the operating pressure, serve to propel the liquid along the wax channel to the top of the reactor (page 7, lines 14 ff.). Contrary to the appellant's position, these features are not merely optional design alternatives but are inextricably linked to the proposed reactor and method, since certain alternative pump location and/or type would require modifying the channel configuration of the relevant embodiment to ensure that the pump still fulfils its intended functions.

1.6.8 Based on the application as filed, it is also not possible to determine whether the features selected from the relevant embodiment are associated with a specific aspect, function, or technical purpose. If that were the case, the selection of these features (and not others) might be justified on the basis that they independently address a particular technical objective or develop a specific aspect of the embodiment, indicating that they are not inextricably linked to features directed to solving other problems

or relating to other aspects of the embodiment. In particular, the board notes that the original description (see page 3, line 20 to page 4, line 8) refers to up to nine different technical objectives, all expressed in broad terms and encompassing substantially different potential inventive concepts (e.g., improving the scalability or transportability of the reactor, reducing selectivity towards methane, simplifying heat exchange, or reducing pressure drop). Apart from the fact that the description as filed provides no meaningful guidance as to which features would be linked to each of these objectives, there is also no indication — nor has any argument been presented to this effect — that the features incorporated into claim 1 were selected in pursuit of any one (or more) of these objectives. Moreover, the amendments do not relate to a single specific aspect of the method: features (i)-(ii) in point 1.2 above concern the substances in the reactor, features (iii)-(vi) relate to the process, and features (vii)-(ix) concern the structure and components of the reactor.

1.7 The board therefore concludes that the subject-matter of the claim extends beyond the content of the application as filed and does therefore not meet the requirements of Article 123(2) EPC.

2. Auxiliary requests 1 - Article 123(2) EPC

2.1 Claim 1 according to auxiliary request 1 reads as follows (amendments with respect to claim 1 of the main request highlighted by the board):

"1. A method of forming a hydrocarbon product using a Fisher-Tropsch process in a reactor (200) having a cylindrical tank body (230) containing a sump (234), a

wax channel (226) and a gas channel (212), the method comprising:
a first step, in a first gas enrichment zone (206) of the reactor (200), of enriching, using a syngas containing carbon monoxide and hydrogen, a carrier material that is in liquid form at the operating temperature of the reactor (200) and that is capable of absorbing carbon monoxide and hydrogen, wherein the carrier liquid is a wax including C5 – C100 hydrocarbons; and
a subsequent step of bringing the enriched carrier liquid into contact with a catalyst in a separate first reaction zone (216) of the reactor (200), wherein the hydrogen and carbon monoxide enriched carrier liquid forms a layer of liquid wax situated on top of the reaction zone (216) and passes through the reaction zone (216);
after passing through the first reaction zone (216), the liquid wax passes through two further gas enrichment and reaction zones ~~before it is pumped from the sump (234) up the wax channel (226) by a pump (204) to the top of the first gas enrichment zone (206)~~, wax accumulates in liquid form in the sump (234) with the excess wax above a controlled level in the sump (234) is removed as product, and wherein part of the wax is pumped from the reactor sump (234) up a wax channel (226) by a pump (204), the wax is driven along the wax channel (226) to the top of the reactor (200) where it forms a layer of liquid wax (240) on a sieve tray (241) located above the first gas enrichment zone (206), and the heat of reaction is removed via an external heat exchanger;
wherein water and low-boiling hydrocarbons are desorbed in the gas enrichment zones (206);

wherein the, or each, gas enrichment zone (206) comprises structured packing material that the liquid wax, hydrogen and carbon monoxide pass through;
wherein the syngas is introduced to the reactor (200) from a gas inlet (208) and is directed by gas-directing plates (210) towards the gas channel (212) and passes between a gas inlet provided by an aperture (228) in the gas channel (226) and an outlet (224) such that the syngas follows a path through the liquid wax in the structured packing to form the hydrogen and carbon monoxide enriched wax;
wherein the gas channel (212) extends through each gas enrichment zone (206) of the reactor (200), and a gas inlet aperture (228) is provided to deliver gas to each gas enrichment zone (206);
wherein the gas stream between the aperture (228) and the gas outlet (224) intersects the direction of wax flow;
wherein the wax channel (226) and the gas channel (212) are concentric, and an annular ring (214) of structured packing is inserted around the wax (226) and gas (212) channels and into the gas enrichment zone (206) and an annular plate (218) is inserted into the reaction zone (216) wherein the plate (218) contains a plurality of apertures (220) and porous cartridges (222) containing a catalyst are retained in some or all of the apertures (220) of the plate (218);
wherein one or more pillars (236) extend from a base of the reactor (200) along part or all of the height of the reactor (200) to support one or more plates (218) and one or more sections of structured packing and one or more seals (238) are provided for the or each plate (218); and
wherein the catalyst catalyses reaction of the carbon monoxide and hydrogen to form the hydrocarbon product."

2.2 Despite the addition of several features compared with claim 1 of the main request, at least some of the objections raised against the main request continue to apply, in particular:

2.2.1 At least some of the objections raised in point 1.6 above remain outstanding, since there is still no correspondence between the optionality or non-optionality of the features in the description as filed and those defined in, or omitted from, the subject-matter of claim 1 at issue. In other words, the claim incorporates certain features that are described as optional while omitting others that are not presented as optional. For example, despite the more detailed definition of the configuration of the reaction zone, method claim 1 still fails to indicate that the liquid wax layers do not merely form in these reaction zones but actually remain to cover them, such that little or no unabsorbed hydrogen and carbon monoxide delivered to the gas enrichment zone reaches the catalyst in the cartridges, as described on page 9, lines 24 ff. (see point 1.6.7 above). These omitted features are not presented as optional in the description as filed and are considered to be inextricably (i.e. functionally) linked to the defined structural features of the reaction and enrichment zones.

2.2.2 Moreover, the objections raised in points 1.6.3 and 1.6.4 above also apply to claim 1 at issue, as it still fails to define several features that are clearly derivable from the figures forming the basis for the amendments and inextricably linked to some of the features defined in claim 1 at issue, such as the adjacent configuration of the wax and gas channels as depicted in Figures 2A and 2B of the application as filed.

2.2.3 It should also be noted, for the sake of completeness, that the above examples of non-optional and/or inextricably linked features omitted from claim 1 do not constitute an exhaustive list, since, as pointed out in the discussion of the main request, the description and figures contain numerous other features which are not described as optional and which likewise remain undefined in the subject-matter of claim 1 at issue.

2.3 The board therefore concludes that auxiliary request 1 does not meet the requirements of Article 123(2) EPC.

3. Auxiliary requests 2 and 3 - Admittance

3.1 Auxiliary requests 2 and 3 were filed for the first time at the appeal stage, so their admittance is at the discretion of the board pursuant to Article 12(4) and (6) RPBA.

3.2 According to Article 12(4) RPBA, "The board shall exercise its discretion in view of, inter alia, the complexity of the amendment, the suitability of the amendment to address the issues which led to the decision under appeal, and the need for procedural economy".

3.3 The board first notes that the amendments made to the subject-matter of claim 1 according to auxiliary requests 2 and 3 do not appear to overcome the objections raised against the higher-ranking requests by the board and in the impugned decision. In particular, the claim is still regarded as an arbitrary combination of optional and non-optional features. The requests are therefore not suitable to address the

issues that led to the decision under appeal. Furthermore, the large number of amendments to claim 1 compared with the claims of the main request and auxiliary request 1, and the fact that all these amendments are based on a detailed embodiment of the description, are clearly contrary to the need for procedural economy.

3.4 Moreover, as indicated at the oral proceedings, the amendments to claim 1 according to auxiliary requests 2 and 3 are not convergent, as some features defined in claim 1 of the main request and/or auxiliary request 1 are no longer included. For example, the concentric configuration of the wax and gas channels — which was defined in both the main request and auxiliary request 1 — is no longer present in claim 1 of auxiliary requests 2 or 3. Since this concentric configuration is considered to be inextricably linked to the other structural features defined in the claim, its deletion, rather than assisting in addressing the issues under Article 123(2) EPC, could potentially give rise to further objections and would be detrimental to procedural economy.

3.5 It is also not apparent why the appellant did not file these requests (in a convergent order) already during the opposition proceedings. Rather, in view of the preliminary opinion(s) as set out by the opposition division, the appellant should have filed these requests in opposition proceedings (Article 12(6) RPBA).

3.6 The board therefore exercised its discretion under Article 12(4) and (6) RPBA to not admit auxiliary requests 2 and 3 into the appeal proceedings.

4. It follows from the above that none of the requests filed by the appellant and admitted by the board meets the requirements of the EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairwoman:

A. Wille J. Hoppe

Decision electronically authenticated