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Datasheet for the decision of 3 February 2021

Case Number: T 1447/17 - 3.3.03

Application Number: 10795346.5

Publication Number: 2513160

IPC: C08F10/02, C08F110/02

Language of the proceedings: EN

Title of invention:
METHOD FOR IMPROVING ETHYLENE POLYMERIZATION REACTION

Patent Proprietor:
TOTAL RESEARCH & TECHNOLOGY FELUY

Opponent:
Ineos Europe AG

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 12(2), 13(3)
RPBA 2020 Art. 25

Keyword:
Novelty - (yes)
Inventive step - (no) -main reqeust
Auxiliary requests admitted - (no) - no reasoning provided in the written submissions

Decisions cited:
T 1732/10

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Case Number: T 1447/17 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 3 February 2021

Appellant: (Opponent)	Ineos Europe AG Avenue des Uttins 3 1180 Rolle,Vaud (CH)
Representative:	King, Alex Mathisen & Macara LLP Communications House South Street Staines-upon-Thames, Middx TW18 4PR (GB)
Respondent: (Patent Proprietor)	TOTAL RESEARCH & TECHNOLOGY FELUY Zone Industrielle C 7181 Seneffe (BE)
Representative:	Hennin, Caroline Marie Odile De Clercq & Partners Edgard Gevaertdreef 10a 9830 Sint-Martens-Latem (BE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 21 April 2017 rejecting the opposition filed against European patent No. 2513160 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	M. C. Gordon
	R. Cramer

Summary of Facts and Submissions

I. The appeal of the opponent lies from the decision of the opposition division posted on 21 April 2017 rejecting the opposition against European patent number 2 513 160.

II. The patent was granted with a set of 10 claims, whereby claim 1 read as follows:

"Method for initiating the polymerization of ethylene monomers in an ethylene polymerization loop reactor, comprising the subsequent steps of:
(a) feeding into said ethylene polymerization loop reactor a liquid hydrocarbon diluent such as isobutane, ethylene monomers and hydrogen;
(b) feeding into said loop reactor at least one metallocene polymerization catalyst; and
(c) polymerizing said ethylene monomers to produce a polyethylene slurry comprising liquid diluent and solid polyethylene particles;
characterized by feeding hydrogen into said ethylene polymerization loop reactor prior to feeding at least one metallocene polymerization catalyst into said ethylene polymerization loop reactor."

III. A notice of opposition was filed in which revocation of the patent on the grounds of Article 100(a) EPC (lack of novelty, lack of inventive step) was requested.

The following documents, *inter alia*, were relied upon in the opposition procedure:

D5: WO-A-2005/000920
D14: US-A-2002/132937

D15: WO-A-2005/000919

IV. The findings of the opposition division, insofar as relevant for the present decision, can be summarised as follows:

The subject matter claimed was novel over *inter alia* the disclosure of D14.

D14 related to a process for start up of an olefin polymerisation process employing two different metal catalysts and optionally hydrogen as a chain transfer agent. However, different types of polymerisation processes were disclosed (slurry, gas phase etc.) and a plurality of selections was required in order to arrive at a process as defined in the operative claims.

The problem described in the patent was to provide a process which permitted the production of polyethylene of improved quality in terms of homogeneity, low gel content and satisfactory melt flow index.

Said problem was solved by the specified initiation procedure whereby it was accepted that specifically the step of feeding hydrogen prior to introduction of the catalyst allowed this problem to be solved.

It was not obvious in the light of the prior art, in particular D14, that the problem could be solved by the claimed measures. D14 exemplified a gas phase process. Insofar as D14 also discussed loop/slurry processes it was not unambiguous that hydrogen was added prior to the catalyst. Furthermore there were doubts that a metallocene catalyst was disclosed in connection with this type of process.

Accordingly the prior art did not render the claimed subject-matter obvious as a solution to the stated problem and an inventive step had to be acknowledged.

The opposition was consequently rejected.

V. The opponent (appellant) lodged an appeal against the decision.

Objections of lack of novelty and lack of inventive step were sustained.

VI. The patent proprietor (respondent) replied to the appeal. Eight sets of claims as auxiliary requests were submitted whereby a number of these had already been presented, but not dealt with, during the opposition proceedings.

VII. With a further written submission dated 19 February 2018 the appellant took position on the arguments of the respondent.

VIII. On 4 September 2019 the Board issued a summons to oral proceedings.

IX. With a letter dated 4 December 2019 the respondent filed 12 sets of claims as auxiliary requests, which included the eight auxiliary requests filed with the response to the statement of grounds of appeal.

X. With communication dated 11 March 2020 the Board set out its preliminary view of the case.

The subject-matter claimed appeared to be novel with respect to the disclosure of D14.

Regarding inventive step the Board took the position that D14 could be considered as closest prior art. The patent in suit had only a single example which did not exemplify the claimed process. Nor did said example correspond to the teaching of D14. Under these circumstances the only problem that could be formulated was the provision of a further process.

Regarding the auxiliary requests the Board observed that there was a paucity of information as to the purpose of the amendments made with respect to the objections raised by the appellant. This in turn put the admittance of the auxiliary requests into question (Article 12(3) RPBA 2020/Article 12(2) RPBA 2007).

XI. The appellant made a further substantive submission with letter of 27 April 2020.

XII. Following further exchanges on organisational matters, oral proceedings were held before the Board on 3 February 2021 via video conference, both parties having agreed to this format in their respective submissions.

XIII. The arguments of the appellant, insofar as relevant for the decision, can be summarised as follows:

(a) Novelty - D14

D14 related to start up of a polymerisation reactor. The process could be applied to any suitable reactor. The document however explicitly taught as one embodiment slurry loop polymerisation reactors. Similarly any suitable catalyst could be employed but metallocenes were stated to be preferred. It was further disclosed that all

conditions for the polymerisation were established in the reactor system prior to start up, i.e. before addition of the catalyst. Similarly the use of hydrogen as chain transfer agent was disclosed. Contrary to the findings of the opposition division, there was therefore no need to make a plurality of selections from the disclosure of D14 in terms of the catalyst, the use of hydrogen and the timing of the various steps in order to arrive at the process as claimed, which was thus not novel over D14.

(b) Inventive step in respect of D14 as the closest prior art

Due to the absence of any suitable examples there was no evidence that either of the distinguishing features recognised by the Board over the disclosure of the embodiment in paragraph 258 of D14, namely the timing of the introduction of hydrogen and the nature of the catalyst, gave rise to a technical effect. Thus the objective technical problem with respect to D14 could only be formulated as the provision of a further start up process for ethylene polymerisation.

It was general knowledge that lack of hydrogen in olefin polymerisation resulted in high molecular weight products and formation of gels. Regarding the question of the timing of the addition of hydrogen, many documents emphasised the need to have this present throughout the reaction, in particular prior to addition of the catalyst.

In any case neither of the distinguishing features could support an inventive step since both

alternatives were suggested in D14. Indeed paragraph 22 of D14 taught to establish all necessary conditions including presence of hydrogen prior to introducing the catalyst to initiate polymerisation. Moreover, other documents relating to slurry loop processes, in particular D5 and D15 employed the same type of start up procedure i.e. with introduction of hydrogen prior to catalyst. Regarding the nature of the catalyst paragraph 22 of the patent explicitly stated that any of metallocene, Ziegler-Natta or chromium catalysts could be used interchangeably suggesting that no particular technical effect was considered to be associated therewith. In this connection it was noted that D14 stated that metallocene catalysts were preferred. Therefore the method of claim 1 was not inventive starting from D14 of the closest prior art.

(c) Admittance of the auxiliary requests

The auxiliary requests were divergent.
In addition no reasoning or explanation had been provided of how the amendments made would address the objections raised by the appellant in the statement of grounds of appeal. Therefore the requests were not substantiated and should not be admitted.

XIV. The arguments of the respondent, insofar as relevant for the decision, can be summarised as follows.

(a) Novelty - D14

There was no single disclosure of all the features of claim 1 in combination. On the contrary, a

plurality of selections from D14 was required.

(b) Inventive step with respect to D14 as closest prior art

The objective problem to be solved was, as set out in paragraphs 10 and 19 of the patent, to provide a polymerisation process allowing improved control of the initiation procedure and thus to obtain better product properties, in particular in terms of the processability (absence of high molecular weight fractions or gels).

The solution to this problem was to control the initiation stage of the polymerisation. As explained in paragraph 19 of the patent, in order to improve the polymer properties it was necessary to adapt the process conditions.

The example and figure 4 of the patent demonstrated that failing to perform start up in terms of the timing of the introduction of hydrogen did not allow good quality product to be obtained.

Providing an example according to the claimed process would not have been very informative since it would simply have confirmed the positive effect of having hydrogen present from the start.

Example 2 of D14 related to a laboratory scale process in a gas phase reactor with preformed polymer present and hence was of no relevance to the claimed process. Thus the skilled person would not have started from this example.

With respect to the general disclosure of D14, although paragraph 258 did relate to a slurry phase process, this teaching was very general. The claimed process differed in a number of respects, not merely the timing of the addition of hydrogen. Furthermore D14 discussed slurry processes in general, but was not focused on the start up and did not specify the required combination of catalyst and required monomer, i.e. ethylene. Furthermore the presence of hydrogen was only optional. D14 did not contain any indication that in processes other than that of the type shown in the example thereof hydrogen was to be employed, let alone that it was to be introduced in advance of the catalyst. Whilst it was accepted that it was general knowledge that the presence of hydrogen in polymerisation had a moderating effect on the molecular weight, it was disputed that it was generally known that there was a benefit by introducing this into the system prior to initiation of the polymerisation. There was no teaching in D14 alone or derivable from other documents, such as D5 or D15, that the objective problem could be solved by the process as claimed. D5 and D15 did not specifically address or emphasise polymerisation start up, even if the sequence as required by the patent was followed in these documents. Hence neither of these would provide any incentive to employ the process steps as claimed in order to solve the objective problem.

The presence of an inventive step should therefore be acknowledged.

(c) Auxiliary requests - admittance

Auxiliary requests 1-4 had been presented in the proceedings before the opposition division although it had not been necessary to deal with them in view of the decision to reject the opposition. In any case these were not new or unknown to the appellant. Moreover, these requests together with auxiliary requests 5 and 10-12 had been filed with the response to the statement of grounds of appeal, therefore at the beginning of the appeal proceedings and had now only been renumbered. The purpose of the auxiliary requests was to highlight new combinations of features and accentuate the distinction over the prior art. However the requests did not really introduce new aspects into the procedure and they should therefore be admitted. Any divergence between the requests had already been present in the first instance proceedings although this question had not been addressed at that juncture. Regarding the absence of explanations in the written submissions, which was not disputed, it was proposed to provide the necessary details and motivations at the oral proceedings before the Board after admittance of the requests.

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

XVI. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of the sets of claims according to auxiliary requests 1 to 12 as filed with letter of 4 December 2019.

Reasons for the Decision

1. Main request

1.1 Novelty with respect to D14

D14 relates to the start up procedure for multiple catalyst polymerisation systems (title).

According to paragraph 21 a continuous gas phase reactor is employed. The reactor is preloaded with a polymer bed and is then brought to reaction conditions *inter alia* by introducing the chain transfer agent (paragraph 22). Once these conditions have been established, the reaction is initiated by introduction of the catalyst (paragraph 23). The preferred chain transfer agent is hydrogen (paragraph 50). Metallocene catalysts are employed as stated in the section commencing at paragraph 55.

This gas phase procedure is demonstrated in D14 by the examples in which the reactor is brought to the required operating conditions (monomers, diluents, chain transfer agent, i.e. hydrogen, required pressure and temperature) prior to introduction of the metallocene catalyst system.

The examples of D14 however in line with the disclosure starting in paragraph 21 do not employ a slurry loop reactor as required by operative claim 1 and for this reason do not anticipate the subject-matter claimed.

Commencing at paragraph 256 of D14 slurry polymerisation processes are generally discussed and in paragraph 258 it is stated that such processes are

carried out continuously in a loop reactor. Catalyst is introduced regularly into the reactor loop and hydrogen is optionally employed as the chain transfer agent.

It is not stated in this passage that a metallocene catalyst is employed. Nor is the precise sequence of start up steps disclosed, in particular at which points hydrogen and catalyst are introduced.

Although the various features of the method of claim 1 are individually disclosed in D14, the specific combination of process type, timing of introduction of chain transfer agent and nature of the catalyst requires a plurality of selections.

Accordingly the subject-matter of operative claim 1 is distinguished from the disclosure of slurry loop processes in D14 starting in paragraph 256 by the features that:
- hydrogen is introduced prior to the catalyst;
- a metallocene catalyst is employed.

Novelty over D14 is therefore acknowledged.

1.2 In view of the conclusions reached below, it is not necessary to address any of the other novelty objections raised by the appellant.

1.3 Inventive step with respect to D14

1.3.1 Closest prior art

The disclosure of loop slurry polymerisation processes commencing at paragraph 256 of D14 can be considered as representing the closest prior art.

1.3.2 Distinguishing features

As noted in section 1.1 above, the claimed method is distinguished from the disclosure of loop slurry processes in D14 by the two features indicated.

1.3.3 Technical effect

The patent in suit has a single example in which feeding of hydrogen is initiated subsequent to introduction of the metallocene catalyst.

This example therefore does not represent the process as claimed due to the inverse order of introducing chain transfer agent (hydrogen) and catalyst.

The evidence of this example is that not complying with the requirements of the claim yields a product with a high gel level which results in problems in subsequent processing. Although it is stated in the final sentence of the patent that such problems could be avoided by feeding hydrogen prior to initiation of the polymerisation, i.e. introducing the catalyst, there is no evidence in the patent to support this position. Nor has any been submitted subsequently. Therefore independently of the question whether the example can be seen as representative of D14, evidence of advantages by means of the sequence according to claim 1 has not been provided.

As to the selection of a metallocene catalyst, no submissions have been provided by the respondent relating to an effect or to the relevance of this feature for the recognition of an inventive step.

1.3.4 Objective technical problem, its solution

In view of the preceding considerations the only technical problem which can be formulated is the provision of a further process based on that taught by D14.

As noted above, said problem was solved by defining the nature of the catalyst and the order of introduction of chain transfer agent and catalyst.

1.3.5 Obviousness

Regarding the sequence of introduction of chain transfer agent and catalyst, the principal teaching of D14 as shown by paragraph 22 and the examples is that it is necessary to establish as far as possible "reaction conditions" including feeding of the chain transfer agent prior to addition of the catalyst to initiate the actual polymerisation.

Such a process is known in the prior art for olefin polymerisation as shown by D5, example 3 and D15, page 9, from line 20 in the section entitled "Polymerisation procedures". The fact that these documents relate to a different reactor set up, namely stirred tanks, does not diminish the relevance since in any catalysed polymerisation process the reaction has to be initiated which only happens once the catalyst has been introduced. Nor has the respondent shown that these teachings would not be relevant for any other reason e.g. relating to the specific requirements of the various processes.

The respondent argued that the purpose of the sole example of the patent was to show that if the claimed

sequence of steps was not complied with, i.e. if polymerisation was initiated prior to introduction of the chain transfer agent, then unsatisfactory product properties are obtained.

This argument appears to amount to an implicit acknowledgement that the normal procedure would indeed be to initiate polymerisation only after all other reaction conditions, including feeding of the chain transfer agent, had been established. This in turn would suggest that the "invention" amounts to nothing more than providing confirmation of the general knowledge of the field by demonstrating that if this known sequence of steps was not followed then problems in terms of the properties and quality of the product obtained would arise.

Under these circumstances the Board is unable to come to any other conclusion than that the defined sequence of start up steps and the alleged benefits thereof was at least known, if not in fact conventional in the art and consequently represented an obvious solution to the problem of providing a further polymerisation process.

Regarding the catalyst, as noted D14 principally employs metallocene catalysts. These are also employed in the two secondary documents invoked, D5 and D15. This leads to the same conclusion, namely that the selection of metallocene catalysts also represents an obvious solution to the problem of providing a further slurry polymerisation process in a slurry loop reactor based on that disclosed generally by D14.

1.3.6 The main request therefore does not meet the requirements of Article 56 EPC.

2. Auxiliary requests- admittance

2.1 During the proceedings before the opposition division a total of seven auxiliary requests were submitted (letter of 26 January 2017). Since the conclusion of the opposition division was that the opposition was to be rejected, no decision had to be taken on the admittance of these requests to the proceedings. Hence at no point could these considered to have been in the proceedings.

Together with the reply to the statement of grounds of appeal eight auxiliary requests were submitted, whereby auxiliary requests 1, 2, 3 and 4 corresponded to auxiliary requests 1, 2, 5 and 7 from the opposition proceedings respectively.

With letter of 4 December 2019 following the summons to oral proceedings but before issue of the Board's preliminary opinion with communication of 11 March 2020 a further 4 auxiliary requests were submitted.

At no point did the respondent however provide anything in the way of an explanation of the rationale behind the auxiliary requests with respect to addressing the objections raised by the appellant.

Instead, beyond indicating the amendments that had been made, the respondent restricted itself to vague general comments such as the purpose being to "accentuate" the differences to the prior art (rejoinder to the statement of grounds of appeal).

The lack of motivation of the auxiliary requests was not disputed by the respondent. On the contrary, at the oral proceedings it was conceded that no detailed

arguments or reasons for the auxiliary requests had been presented and it was proposed to provide such explanations orally.

The admittance of the auxiliary requests filed with the rejoinder to the statement of grounds of appeal is subject by virtue of Article 25(2) RPBA 2020 to Article 12(4) RPBA 2007, that states that "everything presented by the parties ... shall be taken into account by the Board if and to the extent it ... meets the requirements in [Article 12](2)". Article 12(2) RPBA 2007 is therefore also implicitly applicable under Article 25(2) RPBA 2020. Thus the auxiliary requests filed with the rejoinder are only to be taken into account if the rejoinder sets out clearly and concisely why the patent should be maintained in amended form according to any of these requests, in other words why they would overcome objections made by the appellant that were not overcome by a higher ranking request, should the Board come to the conclusion that the higher ranking requests were not allowable. This requirement was not complied with by the respondent in respect of the auxiliary requests filed with the rejoinder and they are therefore not to be taken into account under Article 12(4) RPBA 2007.

2.2 The initial requests were re-filed with the letter of 4 December 2019, making their admission now subject to Article 13 RPBA 2007, as the summons to oral proceedings was notified prior to 1 January 2020 (Article 25(3) RPBA 2020). The same provision applies to the new requests first filed with this letter. According to established case law (Case Law of the Boards of Appeal, 9th edition 2019, V.A.4.12.5) the obligation to substantiate requests applies to requests filed at any stage of the proceedings, irrespective of

whether Article 12 or Article 13 RPBA 2007 applies. If a substantiation is filed after requests are submitted, they may be deemed to have been filed only at the date of filing of the substantiation (see e.g. T 1732/10 of 19 December 2013, point 1.5 of the reasons). If the requests are substantiated only at the oral proceedings they may thus be deemed to have been filed only at the date of the oral proceedings.

2.3 Regarding the proposal to provide the necessary explanations at the oral proceedings, the applicable law is Article 13(3) RPBA 2007 (still in view of Article 25(3) RPBA 2020). This requires that changes to a parties' case after oral proceedings have been arranged are not to be admitted if they raise issues which the Board or the other party cannot reasonably be expected to deal with without adjournment of the oral proceedings. Since there had hitherto been no indication of the purpose and intention behind the auxiliary requests in terms of addressing the arguments advanced by the appellant, anything submitted in respect thereto would by necessity have introduced new issues which neither the appellant or the Board could be in a position to deal with on the day of the oral proceedings.

2.4 For the above reasons the auxiliary requests are not to be admitted.

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:

B. ter Heijden D. Semino

Decision electronically authenticated