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Datasheet for the decision of 28 September 2020

Case Number: T 1055/17 - 3.3.05

Application Number: 11709786.5

Publication Number: 2544796

IPC: B01D53/94, F01N3/08, F01N3/035

Language of the proceedings: EN

Title of invention:
EXHAUST SYSTEM COMPRISING A NOX STORAGE CATALYST AND CATALYSED SOOT FILTER

Patent Proprietor:
Johnson Matthey PLC

Opponent:
Umicore AG & Co. KG

Headword:
Exhaust system/Johnson Matthey

Relevant legal provisions:
EPC Art. 123(2), 84, 54(2), 56
RPBA 2020 Art. 13(2)

Keyword:
Inventive step - (yes)

Decisions cited:
G 0003/14, G 0001/15

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 1055/17 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 28 September 2020

Appellant 2: (Patent Proprietor)	Johnson Matthey PLC 5th Floor, 25 Farringdon Street London EC4A 4AB (GB)
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Representative:	Umicore AG & Co. KG GRD-IPE / Patente Re Rodenbacher Chaussee 4 63457 Hanau-Wolfgang (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 24 February 2017 concerning maintenance of the European Patent No. 2544796 in amended form.**

Composition of the Board:

Chairman	E. Bendl
Members:	S. Besselmann
	P. Guntz

Summary of Facts and Submissions

I. The appeals in this case, by the opponent (appellant 1) and the patent proprietor (appellant 2), lie from the interlocutory decision of the opposition division to maintain European patent EP 2 544 796 B1 in amended form, based on the then pending first auxiliary request filed during the oral proceedings before the opposition division (20 December 2016).

II. The patent in suit concerns an exhaust gas aftertreatment system comprising a NOx storage catalyst and a catalysed soot filter.

III. In the decision under appeal, the following documents, *inter alia*, are referred to:

D1 EP 1 536 111 A1 (1 June 2005)

D10 WO 2008/075111 A1 (26 June 2008)

D13 WO 2010/083355 A2 (22 July 2010)

D14 WO 2010/077843 A2 (8 July 2010)

IV. The opponent filed the following further documents with its statement of grounds of appeal:

D26 WO 2010/118125 A2 (14 October 2010)

D27 EP 1 772 184 A2 (11 April 2007)

V. The opponent raised objections of lack of inventive step in view of D1 in combination with D13, D14 or D26

against the claims upheld by the opposition division and additionally in view of D10, which could alternatively form the closest prior art.

In its reply to the patent proprietor's statement of grounds of appeal, the opponent added objections under Articles 123(2) and 84 EPC against the auxiliary requests submitted by the proprietor.

The opponent withdrew its request for oral proceedings (letter of 25 July 2019), indicating that it was not intending to make any further submissions.

VI. The patent proprietor re-submitted the claims according to the main request and the first to third auxiliary request already filed before the opposition division with its statement of grounds of appeal. In reply to the preliminary opinion of the board, the patent proprietor filed a new main request and a new first auxiliary request (30 July 2020) to precede these requests. Following a further communication from the board, the patent proprietor filed a new main request (26 August 2020) to precede all the requests on file.

VII. Claim 1 of this final main request corresponds in substance to claim 1 upheld by the opposition division, combining the features of granted claims 1, 4 and 5.

VIII. Claim 1 of the final main request reads as follows:

"*An exhaust gas aftertreatment system for a diesel-engined vehicle, which system comprising a NO_x Storage Catalyst (NSC) followed in a downstream direction by a Catalysed Soot Filter (CSF), wherein the CSF comprises an oxidative catalyst comprising a palladium-rich weight ratio of platinum and palladium, wherein the*

oxidative catalyst further comprises an oxygen storage component in an amount of 20-50 weight%, wherein the oxygen storage component comprises ceria or a ceria-zirconia mixed oxide."

Claims 2-7 relate to preferred embodiments, claim 8 relates to a vehicle comprising the exhaust system.

IX. The board informed the parties on 2 September 2020 that the oral proceedings appointed by the summons sent on 18 February 2020 to take place on 22 September 2020 were cancelled.

X. The opponent's arguments, where relevant to the present decision, can be summarised as follows.

The effective date for determining the prior art is the filing date.

The patent in suit does not support any advantage related to the claimed system. Tests have only been conducted using synthetic gas mixtures and an oxidation catalyst on a flow-through monolith, not an actual exhaust gas treatment system. The synthetic gas mixture is described as "rich" but in fact exhibits a lambda value greater than 1. Own measurements show that a lambda value less than 1 is reached during a NSC regeneration event. Moreover, the tests in the patent in suit focus on a single instance during the exhaust gas cleaning cycle and are therefore unsuitable to demonstrate any advantage of the functioning of the system as a whole, which should have been demonstrated in comparison to the closest prior art.

In addition, it is common general knowledge that palladium has better methane oxidation activity than

platinum, and it is not surprising that the presence of an OSC (oxygen storage component) facilitates the oxidation of hydrocarbons under oxygen-deficient conditions.

The test results do not support the alleged advantage of a palladium-rich Pt:Pd ratio and the claimed amount of OSC because there is no comparison with a Pt:Pd composition which is not palladium-rich or with alternative OSC amounts. According to D27, a lower proportion of ceria of only 5% has an advantage under lean conditions.

The disclosure of Document D1 is very similar to the claimed invention both in terms of the technical features and the mode of action. It is therefore predestined to be considered the closest prior art. The subject-matter of claim 1 at issue differs from D1 merely in the proportion of palladium in comparison to platinum and in the amount of OSC. In the absence of any improvement due to these differences, the objective technical problem is merely the provision of an alternative. The proposed solution, namely the claimed system, would have been obvious in view of D13, D14 or D26.

Alternatively, D10 may be regarded as the closest prior art. D10 discloses a NSC followed by a CSF. The CSF may be coated with a Pt- and/or Pd-catalyst on a ceria or ceria-zirconia carrier. Starting from D10, the claimed system is obvious in view of the same documents D13, D14 and D26.

D13 describes diesel oxidation catalysts (DOC) particularly suited for oxidising methane due to their Pd/Ce component. According to D13, the Pd/Ce component

is to be separated from Pt. The Pt:Pd ratio may lie between 1:10 and 10:1. It would only have required routine experiments to identify within this general teaching a palladium-rich catalyst composition comprising a high amount of OSC, as stipulated in the claim at issue.

D14 describes a DOC consisting of a first Pd layer comprising ceria-zirconia or ceria-zirconia-alumina and a second Pt:Pd mixed layer. The skilled person would have identified Example 4 (Pd only) and Example 12 (Pt:Pd=1:1) as promising. Thus, they would have been prompted to create an optimised mix of these two examples, arriving at a palladium-rich weight ratio of Pt and Pd.

D26 relates to oxidation catalysts for an advanced combustion diesel engine. D26 describes a zoned catalyst comprising Pt and Pd on ceria-containing carriers. At least about 50% of the total palladium components are located in the first (inlet end) zone, and at least 50% of the total platinum components are located in the second zone, the total platinum to palladium ratio being from about 1:10 to 4:1. The skilled person would have identified Sample G as a methane selective catalyst and would have used it on the CSF of the system known from D1 or D10.

XI. The patent proprietor's arguments, where relevant to the present decision, can be summarised as follows.

Documents D26 and D27 should be disregarded because they should have been filed before the opposition division.

The opponent had agreed during the opposition proceedings that D10 was the closest prior art to the claims upheld by the opposition division. It should not be allowed to switch to D1 as the closest prior art in the appeal proceedings as this amounted to a different case.

The tests provided in the patent in suit do show an improvement due to the distinguishing technical features. The opponent did not provide any counter-evidence. It is irrelevant whether the test conditions are formally "rich" or "lean".

The opponent did not demonstrate where in the prior art the distinguishing features were disclosed, nor why the skilled person would have combined any such teachings with those of D10.

XII. The patent proprietor requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request filed on 26 August 2020 or, alternatively, on the basis of one of the two requests filed on 30 July 2020, or, alternatively, on the basis of one of the four requests filed with the statement of grounds of appeal (6 July 2017).

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

Reasons for the Decision

1. Need for oral proceedings

1.1 The opponent withdrew its request for oral proceedings (letter of 25 July 2019) and indicated in a further letter (26 August 2020) that it would not attend the oral proceedings.

1.2 The patent proprietor confirmed when filing the final main request (26 August 2020) that its request for oral proceedings was conditional.

1.3 Since the patent proprietor's main request could be granted for the reasons set out below, oral proceedings were not necessary.

Main Request

2. Article 13(2) RPBA 2020

2.1 The final main request was filed after summons to oral proceedings had been issued (summons dated 18 February 2020).

2.2 Claim 1 of this final main request is similar to claim 1 of the previous first auxiliary request upheld by the opposition division, combining the features of granted claims 1, 4 and 5, but more closely adheres to the wording of the granted claims. All method claims have been deleted.

2.3 As argued by the patent proprietor, the final main request addresses the objections under Articles 123(2)

and 84 EPC raised during the appeal proceedings. This request overcomes all pending objections for the reasons set out below. Admitting this request thus serves procedural economy. It avoids the need for oral proceedings, considering that the opponent expressed its intention not to make any further observations in this case (letter of 25 July 2019).

2.4 The board therefore comes to the conclusion that these are exceptional circumstances within the meaning of Article 13(2) RPBA 2020 and admits the final main request into the appeal proceedings.

3. Amendments

3.1 In comparison to granted claim 1, claim 1 at issue includes an additional feature defining that "the oxidative catalyst further comprises an oxygen storage component in an amount of 20-50 weight%, wherein the oxygen storage component comprises ceria or a ceria-zirconia mixed oxide".

3.2 This amendment combines the features of granted claims 4 and 5 and is based on the combination of original claims 4 and 5, seen in conjunction with page 5 (last paragraph) and the examples of the application as originally filed.

3.3 Granted claims 2 and 3 are maintained, claims 4 and 5 have been deleted, and claims 6-10 renumbered accordingly.

3.4 Granted claims 11-13 (method claims) have also been deleted.

3.5 These amendments are not objectionable under Article 123(2) EPC.

4. Clarity

4.1 In accordance with G 3/14 (Order), the claims of the patent may be examined for compliance with the requirements of Article 84 EPC only when, and then only to the extent that, the amendment introduces non-compliance with Article 84 EPC.

4.2 Claim 1 of the final main request includes the precise wording of granted claim 4, according to which the oxidative catalyst comprises the OSC. It does not open the door for new ways of interpretating where the OSC is located. Whether the definition of the amount of the OSC as such is clear cannot be examined in these opposition appeal proceedings.

4.3 The amendments therefore do not introduce any non-compliance with Article 84 EPC.

5. Priority; effective date of claim 1

5.1 The opposition division found that the patent in suit, i.e. the independent claims as granted, did not benefit from the priority date because the priority document did not mention a palladium-rich weight ratio of palladium and platinum in general (point 13 of the impugned decision).

This finding is correct. In particular, the statement at the bottom of page 6 of the priority document ("At 350 °C, it can easily be seen from Fig 2 that samples

containing more Pd than Pt, and OSC, convert most of the HC") refers to the specific samples shown in the figure and does not disclose palladium-rich catalysts in general.

5.2 Claim 1 at issue also stipulates a palladium-rich weight ratio of platinum and palladium and hence does not benefit from the priority date either. Its effective date for the assessment of novelty and inventive step is consequently the filing date (7 March 2011).

5.3 Whether part of the subject-matter encompassed by the claims benefit from the priority date in accordance with G 1/15 (Order) is not decisive for the outcome of this case.

6. Inventive step

6.1 Consideration of the reasoning based on D1 as the closest prior art

6.1.1 Claim 1 at issue corresponds in substance to claim 1 of the first auxiliary request upheld by the opposition division, combining the features of granted claims 1, 4 and 5.

6.1.2 During opposition proceedings, the parties considered D10 the closest prior art with respect to this then pending first auxiliary request (point 16.4.1 of the impugned decision).

6.1.3 In its statement of grounds of appeal, the opponent used document D1 as the closest prior art.

6.1.4 While the opponent had cited both D1 and D10 as possible closest prior art for the main request pending before the opposition division (point 15.3.1 of the impugned decision), it decided to argue lack of inventive step of the then pending first auxiliary request only in view of D10 (point 16.4.1 of the impugned decision, as indicated). According to the minutes of the oral proceedings before the opposition division, the opponent explicitly renounced raising an objection starting from D1 as the closest prior art against this first auxiliary request (point 4.3 of the minutes of oral proceedings).

The first auxiliary request under consideration in the impugned decision had only been filed during the oral proceedings before the opposition division, but its claim 1 was identical to claim 1 of the first auxiliary request filed on 18 November 2016 in preparation for these oral proceedings, and was therefore known to the opponent.

6.1.5 Under these circumstances, the opponent's objection starting from D1 as the closest prior art should have been raised before the opposition division. In its statement of grounds of appeal, the opponent sets out why, in its opinion, D1 should be considered the closest prior art but does not provide any reason why this had not been raised during the opposition proceedings.

6.1.6 Hence, the board decided to disregard the reasoning based on D1, using its discretion under Article 12(4) RPBA 2007 in conjunction with Article 25(2) RPBA 2020.

6.2 Inventive step in view of D10

6.2.1 The patent in suit relates to an exhaust gas aftertreatment system for a diesel-engined vehicle comprising a NO_x storage catalyst (NSC) followed in a downstream direction by a catalysed soot filter (CSF) (paragraph [0001]).

6.2.2 D10 also relates to cleaning diesel exhaust gases and proposes a system comprising a NO_x adsorber catalyst (corresponding to the NSC, see paragraph [0005] of the patent in suit) and a CSF (page 4, line 7, to page 5, line 16). The CSF (20) may be arranged downstream of the NSC (18) (see Figure 1); this arrangement is also shown in Figure 2 (NSC zone (36) upstream of CSF (42)).

D10 thus relates to the same general purpose and system addressed in the patent in suit (paragraph [0001]) and constitutes a possible starting point for assessing inventive step.

6.2.3 According to D10, the CSF includes platinum and/or palladium supported on a suitable support material including alumina and ceria or a mixed oxide or composite oxide of ceria and zirconia (page 5, lines 1-3).

6.2.4 The subject-matter of claim 1 thus differs from D10 in that the oxidative catalyst has a palladium-rich weight ratio of palladium and platinum and in that the amount of the OSC is 20-50 weight%.

6.2.5 It addresses the technical problem of providing an improved exhaust gas aftertreatment system, achieving improved removal of hydrocarbons, including methane,

under conditions of a NSC regeneration event (paragraphs [0009]-[0011] of the patent in suit).

6.2.6 As the solution to this technical problem, the patent in suit proposes the exhaust gas aftertreatment of claim 1, involving a palladium-rich weight ratio of palladium and platinum and an OSC in an amount of 20-50 weight%.

6.2.7 Success of the solution

6.2.8 The opponent contested that the technical problem was successfully solved. In its opinion, there was no evidence of any advantage in comparison to a Pt:Pd composition which was not palladium-rich. It also criticised that no comparison with other amounts of OSC was available.

The opponent furthermore argued that the examples provided in the patent in suit were not representative of an actual exhaust gas treatment system and did not represent all possible exhaust gas compositions and process conditions, i.e. they did not represent the functioning of the system as a whole.

6.2.9 The patent in suit provides test results comprising several catalyst compositions having different Pt:Pd weight ratios and washcoat compositions. Samples D and E provide the best results in that they provide good removal of hydrocarbons not only during the short rich events but also during the longer rich events at an inlet temperature of 300 °C (Figure 1). Even if the comparative catalyst does not contain any OSC and therefore does not directly reproduce the teaching of D10, the examples as a whole show that the claimed

oxidative catalysts may be associated with improved removal of hydrocarbons including methane.

6.2.10 The opponent did not provide any evidence in support of its objection that an actual exhaust gas treatment system would not provide the indicated effect. In the present case, it is not sufficient to merely set out the simplifications and abstractions made in the synthetic catalytic activity test of the impugned patent.

The patent in suit focuses on the indicated technical problem of improving hydrocarbon removal during rich regeneration events. It is not decisive whether any advantages are obtained during other instances of the exhaust gas cleaning process or, for instance, under the lean conditions tested in D27 (notwithstanding the question of admissibility of this anticipation).

6.2.11 The board therefore concludes that the indicated technical problem is successfully solved.

6.2.12 Obviousness of the solution

6.2.13 D10 itself does not specifically address the problem of removing methane or hydrocarbons during the rich generation of the NSC and hence would not have prompted the skilled person to modify the CSF for this purpose.

The skilled person would have found no instructions in D10 to select specifically a catalyst known for its methane oxidation activity. It is therefore irrelevant whether it is common general knowledge that palladium has better methane oxidation activity than platinum.

6.2.14 According to the opponent, the proposed solution is rendered obvious by each of D13, D14 and D26.

6.2.15 These documents, D13, D14 and D26, form part of the state of the art within the meaning of Article 54(2) EPC with respect to claim 1 at issue for the reasons indicated (point 5.).

6.2.16 However, neither D13 nor D14 has been shown to constitute a pointer towards the claimed palladium-rich weight ratio of platinum and palladium. The opponent acknowledges that a selection within the general disclosure of these documents would have been needed but argues that the skilled person would have conducted routine experiments to identify a catalyst composition within the scope of the claim at issue.

In this case, the need for further experiments by contrast implies that there is no direct pointer towards the claimed solution in D13 and D14.

6.2.17 D26 has been cited in the statement of grounds of appeal. The patent proprietor contested its admissibility into the appeal proceedings.

6.2.18 Irrespective of the questions of admissibility of this document into the appeal proceedings, D26 would not have led the skilled person to the proposed solution.

6.2.19 Neither D10 nor D26 specifically addresses the problem of removing hydrocarbons or methane during the rich generation of the NSC. Hence, neither of these documents would have prompted the skilled person to modify the CSF for this purpose.

The general teaching of D26 is a zoning strategy for a DOC in which at least about 50% of the total palladium components are located in the first (inlet end) zone and at least 50% of the total platinum components are located in the second zone (paragraph [0012]), the total platinum to palladium ratio being from about 1:10 to 4:1 (paragraph [0014]). The catalysts (or zones) taught in D26 do not necessarily have a palladium-rich weight ratio.

While D26 generally suggests that the zoned catalysts are beneficial for destroying high levels of CO and hydrocarbons (HC) (especially methane) (page 27, last paragraph), the examples do not indicate methane conversion.

The opponent relies in particular on Example G of D26. This catalyst does have a palladium-rich front zone (Pt:Pd ratio of 1:2). However, its hydrocarbon conversion is not improved in comparison to the Pt only catalyst. The methane conversion is not indicated. Hence, the skilled person would have had no reason to identify Example G as particularly suited for solving the problem posed or for the CSF of D10.

6.2.20 Starting from D10 as the closest prior art, none of D13, D14 or D26 would have guided the skilled person towards the subject-matter of claim 1.

6.3 The objection of lack of inventive step is not convincing.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the main request filed on 26 August 2020 and a description to be adapted where appropriate.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated