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DECISION
of 26 November 2003

Case Number: T 0813/01 - 3.3.5

Application Number: 95116599.2

Publication Number: 0707882

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Language of the proceedings: EN

Title of invention:
Catalyst for purifying exhaust gases

Applicant:
TOYOTA JIDOSHA KABUSHIKI KAISHA, et al

Opponent:
-

Headword:
-

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

Keyword:
"Main, first and second auxiliary requests: inventive step (no)"
"Third auxiliary request: amendments not allowable"

Decisions cited:
-

Catchword:
-



Case Number: T 0813/01 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 26 November 2003

Appellant:

TOYOTA JIDOSHA KABUSHIKI KAISHA
1, Toyota-cho
Toyota-shi
Aichi-ken 471-8571 (JP)

Representative:

Winter, Brandl, Fürniss, Hübner, Röss
Kaiser, Polte
Partnerschaft
Patent- und Rechtsanwaltskanzlei
Alois-Steinecker-Strasse 22
D-85354 Freising (DE)

Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 28 February 2001
refusing European application No. 95116599.2
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: M. M. Eberhard
Members: A.-T. Liu
J. H. Van Moer

Summary of Facts and Submissions

- I. The appeal was lodged against the decision of the Examining Division refusing patent application No. 95 116 599.2 concerning a catalyst for purifying exhaust gases.
- II. The examining division held that the subject-matter of claims 1 and 11 of the main and second auxiliary requests lacked an inventive step with regard to document D7 (EP-0 613 714) in combination with D1 (EP-0 370 523). The first auxiliary request was refused on the ground that it infringed Article 123(2) EPC.
- III. The appellant submitted amended claims with his statement of grounds of appeal dated 9 July 2001. In reply thereto, the Board issued a communication in an annex to the summons to attend oral proceedings, indicating their preliminary view concerning the patentability of the claims on file.
- IV. At the oral proceedings before the Board of Appeal on 26 November 2003, the appellant filed four new sets of amended claims as the basis for a main and three auxiliary requests.
- V. Claim 1 of the main request read as follows:
- "A catalyst for removing HC, CO and NO_x included in exhaust gases whose oxygen concentrations are more than required for completely oxidizing reducing components included therein, thereby purifying the exhaust gases, comprising:
- a honeycomb support substrate formed of cordierite,

an alumina support;
a Ti-Zr composite oxide loaded on said alumina support;
at least one NO_x storage compound selected from the group consisting of alkali metals, alkaline-earth metals and rare earth elements, loaded on said alumina support, to store a majority of the NO_x in oxygen-rich atmosphere and to release and remove the stored NO_x in fuel-rich atmosphere by a reaction with the reducing components included therein when the air/fuel ratio of the exhaust gases is periodically changed from oxygen-rich to fuel-rich; and
a noble metal element loaded on said alumina support,
a coating layer formed on the support substrate and including the alumina support, the Ti-Zr composite oxide, the at least one NO_x storage compound and the noble metal element."

VI. Claim 1 of the first auxiliary request read as follows:

"A catalyst for removing HC, CO and NO_x included in exhaust gases whose oxygen concentrations are more than required for completely oxidizing reducing components included therein, thereby purifying the exhaust gases, comprising:

a honeycomb support substrate formed of cordierite, an alumina support;
a Ti-Zr composite oxide loaded on said alumina support;
at least one NO_x storage compound selected from the group consisting of alkali metals, alkaline-earth metals and rare earth elements, loaded on said

alumina support, to store a majority of the NO_x in oxygen-rich atmosphere and to release and remove the stored NO_x in fuel-rich atmosphere by a reaction with the reducing components included therein when the air/fuel ratio of the exhaust gases is periodically changed from oxygen-rich to fuel-rich, wherein said NO_x storage compound is loaded in an amount of from 0.05 to 0.5 moles with respect to 100 grams of said alumina support; and a noble metal element loaded on said alumina support,
a coating layer formed on the support substrate and including the alumina support, the Ti-Zr composite oxide, the at least one NO_x storage compound and the noble metal element."

VII. Claim 1 of the second auxiliary request read as follows:

"A catalyst for removing HC, CO and NO_x included in exhaust gases whose oxygen concentrations are more than required for completely oxidizing reducing components included therein, thereby purifying the exhaust gases, comprising:

an alumina support;

a Ti-Zr composite oxide loaded on said alumina support;

at least one NO_x storage compound selected from the group consisting of alkali metals, alkaline-earth metals, loaded on said alumina support, to store a majority of the NO_x in oxygen-rich atmosphere and to release and remove the stored NO_x in fuel-rich atmosphere by a reaction with the reducing components included therein when the air/fuel ratio of the exhaust gases is periodically changed

from oxygen-rich to fuel-rich, wherein said NO_x storage compound is loaded in an amount of from 0.05 to 0.5 moles with respect to 100 grams of said alumina support; and a noble metal element loaded on said alumina support, wherein said noble metal element is loaded on said alumina support after loading said Ti-Zr composite oxide."

VIII. Claim 1 of the third auxiliary request read as follows:

"A catalyst for removing HC, CO and NO_x included in exhaust gases whose oxygen concentrations are more than required for completely oxidizing reducing components included therein, thereby purifying the exhaust gases, comprising:

a honeycomb support substrate formed of cordierite, an alumina support;

a Ti-Zr composite oxide loaded on said alumina support;

at least one NO_x storage compound selected from the group consisting of alkali metals, alkaline-earth metals, loaded on said alumina support, to store a majority of the NO_x in oxygen-rich atmosphere and to release and remove the stored NO_x in fuel-rich atmosphere by a reaction with the reducing components included therein when the air/fuel ratio of the exhaust gases is periodically changed from oxygen-rich to fuel-rich, wherein said NO_x storage compound is loaded in an amount of from 0.05 to 0.5 moles with respect to 100 grams of said alumina support; and a noble metal element loaded on said alumina support,

a coating layer formed on the support substrate and including the alumina support, the Ti-Zr composite oxide, the at least one NO_x storage compound and the noble metal element, wherein said noble metal element is loaded on said alumina support after loading said Ti-Zr composite oxide."

IX. The appellant's arguments may be summarised as follows:

- According to the closest prior art document D7, the alumina support is first deposited onto a substrate, then loaded with the catalytic ingredients.
- In contrast thereto, the catalyst according to claim 1 of the main request comprises a coating layer which is first loaded with the catalytic ingredients before being brought onto the honeycomb substrate formed of cordierite.
- The technical problem to be solved by the invention as claimed is the provision of a catalyst which overcomes the poisoning by sulphur of its NO_x storage compound and has a support which is less likely to adsorb SO_x which is present in the gas to be treated. There is no incentive for the skilled person to look for a solution to that technical problem in document D1 which is directed to a different technical field.
- Furthermore, even a combination of the teaching of D1 with that of D7 would not lead to a catalyst according to claim 1 of the main request.

- In view of the test data in D7, the skilled person would not incorporate the NO_x storage compound in the amount as stipulated in claim 1 of the first auxiliary request.

 - Since the catalyst according to the second auxiliary request does not contain a rare earth metal, the skilled person would not have the incentive of consulting D1 to solve the present technical problem.

 - Even a combination of D1 with D7 would not lead to the order of loading of the noble metal component and Ti-Zr composite oxide as defined in claim 1 of the second auxiliary request.

 - The support for claim 1 of the third auxiliary request can be found in the claims and in the description as originally filed, page 20, first paragraph, in particular line 10.
- X. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed at the oral proceedings or, in the alternative, on the basis of the first, second or third auxiliary request also filed at the oral proceedings.

Reasons for the Decision

Main request

1. Inventive step
 - 1.1 Claim 1 is directed to a catalyst comprising a cordierite honeycomb support substrate and a coating layer formed on the support substrate. The coating layer includes an alumina support which is loaded with a Ti-Zr composite oxide, at least one NO_x storage compound and a noble metal element (see item V above). The catalyst is intended for purifying automotive exhaust gases (published application, page 1: "Field of the Invention").
 - 1.2 The Board concurs with the appellant in that D7 should be considered to comprise the closest prior art, as it is also directed to catalysts which can efficiently purify nitrogen oxides in the exhaust gases which contain oxygen in excessive amounts required for oxidising carbon monoxide and hydrocarbons therein, (page 3, lines 5 to 8). D7 discloses a catalyst comprising a honeycomb substrate formed of cordierite coated with an alumina layer as a porous support, with Pt and/or Pd and at least two ingredients loaded thereon which are capable of reacting with SO₂ contained in the exhaust gases. The latter two ingredients are selected for example from the group of alkali metals or the group of alkaline earth metals or the group of rare earth metals, or they may be at least one alkaline metal and at least one rare earth metal, or at least one alkaline earth metal and at least one rare earth metal. The rare-earth elements, alkali metal and

alkaline earth metal ingredients are described as being capable of storing NO_x in fuel-lean atmosphere so that the latter is reacted with CO and HC contained in the exhaust gases in atmospheres ranging from the stoichiometric atmosphere to the fuel-rich atmospheres (page 4, line 2, to page 5, line 44; page 6, lines 27 to 37; page 7, lines 10 to 28; Tables 1 to 7 and claims 1, 3, 4, 6 and 7).

1.3 The Board further accepts the appellant's submission that, with respect to D7, the technical problem to be solved is seen in the provision of a catalyst which has a support which is less likely to adsorb SO_x and which overcomes the poisoning by sulphur of its NO_x storage compound (Statement of the grounds of appeal, paragraph bridging pages 2 and 3).

1.4 To solve the technical problem stated above, claim 1 proposes a catalyst which is essentially distinguished from that disclosed in D7 in that the coating layer includes a Ti-Zr composite oxide loaded on the alumina support.

1.5 As is not refuted by the appellant, the problem of sulphur poisoning associated with activated alumina carriers is well known in the prior art (see for example D1, page 2, lines 40 to 41). It is indicated in D1 that this problem is usually solved by using as support a composite oxide of titanium with vanadium, tungsten, molybdenum and iron. These known catalysts not only keep their activity in the reduction of nitrogen oxides unaffected by SO_x which coexists in the waste gas but also exhibit a desirable activity as compared with catalysts having activated alumina as a

substrate (see D1, page 2, lines 43 to 45, and page 3, lines 4 to 9). However, those known catalysts being deficient in heat resistance, D1 further discloses catalysts specifically containing a composite oxide of titanium and zirconium possessing a crystalline structure of $ZrTiO_4$, which have the advantage of exhibiting thermal stability in addition to chemical stability (page 3, lines 12 to 18, 26 to 28 and 41 to 43). As is no longer disputed by the appellant, such a material is encompassed by the wording of claim 1 which stipulates a catalyst "comprising ... a Ti-Zr composite oxide" (see item V above).

The Board holds that, when seeking to reduce the SO_x absorption by the coating layer of the catalysts disclosed in D7, it is obvious that the skilled person would turn to D1 and adopt the solution proposed therein, which is the incorporation of such Ti-Zr composite oxide as support material. In the Board's judgment, the choice of replacing all or part of the alumina support material in the catalysts according to D7 with Ti-Zr composite oxide depends in particular on the extent to which the SO_x adsorption is to be reduced. This choice is a matter of trial and error which lies within the competence of the skilled person.

In the process for making the catalysts according to D7, the honeycomb support substrate is immersed into an alumina containing slurry for forming an alumina coating layer thereon (page 7, lines 10 to 16). Replacing part of the alumina support material with Ti-Zr composite oxide in this process would result in a honeycomb support substrate being coated with "a Ti-Zr composite oxide loaded on the alumina support" (and

vice versa). As a consequence, the Board holds that the solution as proposed in claim 1 for solving the present technical problem, namely the provision of a catalyst comprising a coating layer containing Ti-Zr composite oxide loaded on the alumina support, is obvious in view of D1.

- 1.6 The Board cannot follow the appellant's argument that "one skilled in the art does not obtain any information from document D1 how to solve the problem of sulphur poisoning of the NO_x storage compound and how to reduce the adsorption of SO_x with respect to the support" (see statement of grounds of appeal, page 5, first paragraph). It is indicated in D1 that "the catalyst formed of an oxide of the combination of titanium with vanadium ..., not only **keeps its activity in the reduction of nitrogen oxides unaffected by SO_x, ... but also exhibits a desirable activity as compared with the catalyst having activated alumina as a substrate and excels also in acidproofness.**" (page 3, lines 5 to 9, emphasis added). In the Board's view, D1 not only expressly mentions the problem of sulphur poisoning in respect of catalysts for the reduction of NO_x but clearly indicates the improved chemical resistance and thermal stability obtained by replacing alumina as catalyst carrier with a Ti-Zr composite oxide (see item 1.5 above). The Board therefore holds that, in order to solve one aspect of the technical problem with respect to D7, namely improving the resistance of the support against sulphur poisoning, the skilled person has enough incentive to combine D1 with D7, even if the other aspect of the technical problem, namely the poisoning by sulphur of a NO_x storage compound, is not addressed in D1.

1.7 The appellant has submitted that "the object in document D1 is to improve the thermal resistance" of the catalysts. For that reason, the skilled person would not turn to D1 to solve the technical problem of sulphur poisoning (see statement of grounds of appeal, page 3, last paragraph, to page 4, penultimate paragraph).

As has already been observed above (item 1.5), the thermal resistance entailed by the incorporation of a Ti-Zr composite oxide is not obtained to the detriment of its chemical resistance to sulphur poisoning. Moreover, it is common knowledge that resistance to thermal degradation is also an important and desirable property for automotive catalysts. Against this background, the skilled person would have all the more incentive to apply the teaching of D1 and replace at least part of the alumina support layer by a Ti-Zr composite oxide with the aim of obtaining the same benefit, namely resistance to thermal degradation in addition to resistance to sulphur poisoning.

1.8 The appellant has also asserted that the primary use of the catalyst of D1 is not for treating automotive exhaust gases as in the present application or in D7 but for the selective reduction of waste gas emanating from varying industrial processes, using ammonia as reducing agent (D1, page 2, lines 13 to 16; page 6, line 54 to page 7, line 24, in particular page 7, lines 9 to 10, and the statement of grounds of appeal, page 4, last paragraph). In contrast to D7 or to the claimed invention, the catalyst of D1 is thus not exposed to reaction conditions wherein the air/fuel

ratio of the exhaust gases is periodically changed from oxygen-rich to fuel-rich. According to the appellant, the skilled person therefore would not turn to D1 for a solution to the technical problem as stated above.

The Board observes that the title of D1 is "carrier for gas-treating catalyst, method for production thereof, and gas-treating catalyst incorporating said carrier therein". Under the subtitle "Field of the invention", it is further stated that the document "relates to a carrier for a waste gas-treating catalyst". More particularly, it refers to the disclosure as relating to **"a catalyst for cleaning a waste gas emanating from an internal combustion engine, or a catalyst for removing nitrogen oxides from a waste gas emanating from a varying industrial process** using a boiler, a gas turbine, or a heating furnace by causing catalytic reaction of ammonia upon the nitrogen oxides." (page 2, lines 7 to 16, emphasis added). In the Board's view, the skilled person would derive therefrom that D1 is also directed to catalysts for cleaning waste gas emanating from an internal combustion engine although the treatment of waste gases from industrial processes by reaction with ammonia is more particularly discussed in the passage of the description referred to by the appellant (page 6, line 24, to page 7, line 24). Furthermore, the catalysts disclosed in D1 comprise a support loaded with at least one metal selected from a group consisting of manganese, iron, chromium, vanadium, molybdenum, cerium, cobalt, nickel, tungsten, copper, tin, silver, gold, platinum, palladium, rhodium, ruthenium and iridium (see D1, page 3, lines 48 to 52 and claim 10). Some of those ingredients, namely the rare earth element cerium, and the noble metals

platinum and palladium, are the same active ingredients which are incorporated in the catalyst of D7 (see item 1.2 above). The skilled person would thus have no reason to doubt the suitability of the catalysts of D1 for treating automotive exhaust gases. He would therefore use the teaching of D1 to solve the present technical problem (item 1.3).

- 1.9 Finally, the appellant has alleged that in D7, the alumina support is first deposited on to the honeycomb substrate then loaded with the various catalytic elements. In contrast thereto, claim 1 is directed to a catalyst which comprises "a coating layer formed on the support substrate and including the alumina support, the Ti-Zr composite oxide, the at least one NO_x storage compound and the noble metal element". According to the appellant, this implies that the alumina support is already loaded with these components before it is deposited on the honeycomb substrate. The support for this interpretation is to be found in the examples of the application (first to seventh preferred embodiments). Even a combination of document D1 with D7 would not therefore lead to the subject-matter of claim 1.

In the Board's judgment, however, the stipulation in claim 1 that the various components (Ti-Zr composite oxide, the at least one NO_x storage compound and the noble metal element) are loaded on the alumina support encompasses both possibilities, namely before or after the alumina is deposited on the cordierite substrate. The Board is therefore of the view that the wording of the claim cannot be interpreted in such a way as to be restricted by either preparation process.

- 1.10 As a corollary of the above, the Board holds that the subject-matter of claim 1 lacks an inventive step with regard to D7 in combination with D1 (Article 56 EPC).

First auxiliary request

2. *Inventive step*

- 2.1 The subject-matter of claim 1 of the present request differs from that of claim 1 of the main request in that it additionally stipulates that the "NO_x storage compound is loaded in an amount of from 0.05 to 0.5 moles with respect to 100 grams of said alumina support" (item VI above). As is admitted by the appellant, the amounts of NO_x storage compounds used in most of the catalysts according to the first to seventh preferred embodiments and shown in Tables 1 to 6 of D7 fall within the range of NO_x storage compound as stipulated in present claim 1.
- 2.2 The appellant has observed that the amounts of NO_x storage compounds used in the eighth preferred embodiment and shown in Table 7 of D7 are outside the range stipulated in claim 1. And yet, these catalysts are "improved in terms of the NO_x conversion after the durability test over the catalysts according to the first to seventh preferred embodiments". The appellant has advanced the argument that, in view of these test results, the skilled person would not have the incentive to load the NO_x storage compound on to the alumina support in the amounts disclosed in most of the embodiments of D7 and would rather choose a range covering the amounts used for the eighth preferred

embodiment in D7. Thus, even a combination of D7 with D1 would not result in the subject-matter of claim 1, which therefore should be regarded as involving an inventive step.

- 2.3 The Board cannot share the appellant's view for the following reasons. The catalysts according to the eighth embodiment of D7 require, in addition to the noble metal, five components in a high amount whereas in most of the other examples of D7 (according to the first to seventh preferred embodiments), the catalysts contain two ingredients as NO_x storage compounds in a lower amount falling within the range of 0.05 to 0.5 mole per 100g alumina support. The test data in Tables 1 to 7 show that a number of these catalysts containing a combination of only two NO_x storage compounds in lesser amounts also conserve a relatively high NO_x conversion after the durability test. Especially those including a combination of Ba and Mg are said to be particularly advantageous (see page 15, lines 20 to 24). Furthermore, it cannot be inferred from D7 that the better NO_x conversion after durability testing of the catalysts according to the eighth embodiment is due to the high amount of the NO_x storage compound rather than to the specific combination of the five components. Therefore, the skilled person, faced with the present technical problem, would have no particular incentive to start from this eighth embodiment. He would also take the other (first to seventh) embodiments into consideration. By taking the loading amounts disclosed for the overwhelming majority of those embodiments into account, the skilled person would arrive at the subject-matter of present claim 1

in the same manner as indicated with respect to claim 1 of the main request.

- 2.4 As a corollary of the above, the Board considers that the finding of lack of inventive step for the subject-matter of claim 1 of the main request applies *mutatis mutandis* to the subject-matter of present claim 1.

Second auxiliary request

3. *Inventive step*

- 3.1 Claim 1 of the present request essentially differs from claim 1 of the first auxiliary request in that:

- (i) it does not stipulate a honeycomb support substrate formed of cordierite
- (ii) it does not list a rare earth metal element to select from the group of NO_x storage compounds and
- (iii) it stipulates that the noble metal element is loaded on the alumina support after the loading of the Ti-Zr composite oxide.

- 3.2 Re: feature (i)

Deletion of the requirement for a support substrate

The Board would first of all point out that claim 1 is directed to a catalyst **comprising an alumina support** (emphasis added). Due to the word "comprising", the present claim does not exclude catalysts having the alumina support as a coating layer on a support

substrate, even if the latter is not expressly stipulated in the claim. The lack of an explicit stipulation of a honeycomb support substrate therefore does not change in any way the finding on inventive step.

3.3 Re: feature (ii)

Deletion of "rare earth elements" from the group of NO_x storage compounds.

According to D7, the catalysts which are efficient in removing HC, CO and NO_x from exhaust gases may comprise alkali metals, alkaline-earth metals and rare earth elements as NO_x storage ingredients (see item 1.2 above). In addition, the combination of two alkaline earth compounds, namely Ba and Mg, is found to be particularly advantageous (see D7, page 15, lines 20 to 24 and Table 5, catalysts 77 and 78 whose amounts of NO_x storage compounds fall within the claimed range). Thus, claim 1 still offers the choice of NO_x storage compounds which are found to be particularly advantageous in D7. The deletion of rare earth elements from the group of NO_x storage compounds from which to choose is therefore not significant for the assessment of inventive step starting from D7.

The appellant has asserted that the deletion of rare earth elements from the group of NO_x storage compounds from which to choose makes the subject-matter of claim 1 more remote from the disclosure of D1. The Board notes that alkali metals and alkaline earth metals are indeed not mentioned in D1. However, this document does not contain any information suggesting

that the Ti-Zr composite oxide carrier recommended therein could have a negative effect on the NO_x storage capacity of the alkali metals and alkaline earth metals. Therefore, the skilled person, confronted with the problem of sulphur poisoning of the catalysts, would not be led away from combining the teaching of D1 with that of D7. The question as to whether the skilled person would combine D1 with D7 therefore has to be answered in the positive for the same reasons as elaborated above for the main request.

3.4 Re: feature (iii)

Loading of a noble metal element on to alumina after the loading of Ti-Zr composite oxide.

The appellant has remarked that the catalysts of D7 do not contain a Ti-Zr composite and those of D1 do not include a NO_x storage compound. Therefore, even if the skilled person knew that the support was improved by the incorporation of an Ti-Zr composite oxide, he could not derive the present order of loading of the ingredients from a combination of D7 with D1.

The Board observes that D1 is directed to a carrier "comprising an inorganic refractory oxide containing a composite oxide of titanium and zirconium possessing a crystalline structure of ZrTiO₄" and that the catalyst for treatment of a waste gas comprises this carrier with "a catalytically active component" (see abstract). Clearly, the Ti-Zr composite oxide is disclosed in D1 as being part of the carrier and not a catalytic ingredient. To the Board, it is thus obvious that the skilled person, when applying this teaching of D1,

would contemplate first loading the Ti-Zr composite oxide on to alumina as part of the support, before loading the resulting support with a noble metal element which is the catalytically active component. D1 also discloses impregnating the Ti-Zr composite oxide powder with the noble metal salt and loading the calcined powder on to the alumina support (page 6, lines 51 to 53). Between these obvious alternatives, the selection of the more appropriate sequence for loading the two components Ti-Zr composite oxide and noble metal compound lies within the competence of the skilled person and can be achieved by routine experimentation. At the oral proceedings, the appellant no longer argued that the stipulated sequence of loading interacts with the remaining features of the claim in such way as to achieve a particular effect. As a consequence, the Board holds that this feature does not contribute to imparting an inventive step to the claimed subject-matter. Therefore, the finding indicated in items 1.10 and 2.4 above also applies to claim 1 of the present request.

Third auxiliary request

4. *Amendments*

4.1 Claim 1 of this request has been amended such that it is directed to a catalyst comprising:

- (a) a honeycomb support substrate formed of cordierite,
- (b) a coating layer formed on the support substrate and including an alumina support, a Ti-Zr

composite oxide, at least one NO_x storage compound and a noble metal element,

(c) wherein said noble metal element is loaded on said alumina support after loading said Ti-Zr composite oxide (see item VIII).

4.2 As submitted by the appellant at the oral proceedings, the disclosure of a catalyst comprising a support coated as a carrier layer on a surface of a monolithic support substrate is to be found in dependent claim 14 as originally filed. This claim refers back to original claims 11 and 12 which are respectively directed to a catalyst comprising a support including a composite oxide of titanium and zirconium or a composite oxide of titanium, zirconium and yttrium. It is undisputed that there is no mention of an alumina support in these claims. On the other hand, a catalyst comprising an alumina support is claimed in claim 1 as originally filed. Furthermore, the order of loading of the catalytic ingredients is stipulated in original dependent claim 10 which refers back to claim 1. It is irrefutable that there is no cross-reference between original claims 1 to 10 relating to "the first aspect of the invention", which concerns catalysts comprising an alumina support, and original claims 11 to 18 relating to "the second aspect of the invention", concerning catalysts with a support including a composite oxide of titanium, zirconium (and optionally yttrium) coated as a carrier layer on a surface of a monolithic support substrate or a metallic substrate or a pellet-shaped substrate. The appellant has, however, asserted that, due to the unity of invention, the divulgation for "the second aspect of the invention"

also concerns "the first aspect of the invention", in particular since the presence of a substrate is not essential to the claimed invention. In other words, the skilled person would also consider the disclosure of a monolithic support substrate in claim 14 to be applicable to the subject-matter of claim 1.

The Board, however, has difficulty following the appellant's argument since the requirement of unity of invention (Article 82 EPC) is in no way related to the requirement of Article 123 (2) EPC which concerns the amendments made after a European patent application has been filed. As admitted by the appellant, there is no explicit disclosure of a catalyst comprising the above combination of features (a), (b) and (c) in the original claims.

- 4.3 As basis for the combination of features as claimed, the appellant has made reference to a passage of the original description which relates to "preparing a support having a coating layer thereon" (page 20, lines 8 to 10). However, the passage concerned is part of the description for preparing a catalyst according to the first preferred embodiment, beginning on page 18, paragraph 3, and ending on page 20, after the first full paragraph. In that particular example, as indeed in all the examples using a honeycomb support substrate of cordierite and alumina (namely according to the second to seventh preferred embodiments), the alumina is first loaded with platinum, then with the Ti-Zr composite oxide (page 18, penultimate paragraph, to page 23, first paragraph). The remaining examples, termed eighth to sixteenth preferred embodiments, concern the preparation of powdered catalysts

containing neither a honeycomb support substrate nor alumina. The sequence of loading stated in the paragraph bridging pages 11 and 12 is the same as in original claim 10. This disclosure is said to concern "the first aspect of the invention". i.e. the aspect concerning original claim 1 in which the Ti-Zr composite oxide is loaded on the alumina support. There is no mention of a honeycomb support substrate of cordierite in this context. Thus, even when the original claims are seen in the light of the description (including the examples), these original documents do not provide support for the combination of features as stipulated in present claim 1 (see item 4.1 above). The requirements of Article 123(2) EPC are therefore not met.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

A. Wallrodt

M. M. Eberhard