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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* WILLIAM DOUGLAS GILLESPIE,  
ALEXEI GRIGORIEVICH GABRIELOV, PETER WOLOHAN,  
and JOHN ANTHONY SMEGAL

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Appeal 2019-005438  
Application 14/453,871  
Technology Center 1700

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Before ROMULO H. DELMENDO, LINDA M. GAUDETTE, and  
LILAN REN, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellant<sup>1</sup> appeals under 35 U.S.C. § 134(a) from the Primary Examiner's final decision to reject claims 1 and 4–11.<sup>2</sup> We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42—i.e., Shell Oil Company (Application Data Sheet filed August 7, 2014 at 5), which is also identified as the real party in interest (Appeal Brief filed January 21, 2019 (“Appeal Br.”) at 2 (document not paginated)).

<sup>2</sup> See Appeal Br. 3–11; Final Office Action entered May 22, 2018 (“Final Act.”) at 3–10; Examiner's Answer entered April 5, 2019 (“Ans.”) at 4–15.

## I. BACKGROUND

The subject matter on appeal relates to a supported catalyst composition for hydroprocessing hydrocarbon feedstocks and to a hydroprocessing process using such a supported catalyst composition (Specification filed August 7, 2014 (“Spec.”) at 1, ll. 7–9; 2, ll. 8–24). Representative claim 1 is reproduced from the Claims Appendix to the Appeal Brief, as follows:

1. A composition for use in the hydroprocessing of a hydrocarbon feedstock, wherein said composition comprises:

a dried and calcined support material that is thereafter impregnated with at least two metal components followed by drying and calcination thereof, and thereafter impregnated with an organic additive capable of forming a metal complex with said metal component and having a complexation energy of an absolute value of greater than 470 kcal/mol, and

wherein said organic additive is selected from a group consisting of amide compounds, amine compounds, nitrile compounds, pyrrolidone compounds, urea compounds, and oxalate compounds, and

wherein said metal components are one metal from a first group of metals consisting of cobalt and nickel, present in said composition in an amount in the range of from 0.5 wt.% to 20 wt.%, and a second group of metals from the group of metals consisting of molybdenum and tungsten, present in said composition in an amount in the range of from 5 wt. % to 50 wt.%, wherein the weight percents are based on the weight of the dry support material with the metal component as the elemental form regardless of its actual form, and

wherein said support material is a porous refractory oxide selected from the group of refractory oxides consisting of silica, alumina, titania, zirconia, silica-alumina, silica-titania, silica-zirconia, titania-alumina, zirconia-alumina, silica-titania and combinations of two or more thereof; and

wherein said support material has a surface area (as determined by the BET method) in the range of from 50 m<sup>2</sup>/g to 450 m<sup>2</sup>/g, a mean pore diameter in the range of from 50 to 200

angstroms (Å), and a total pore volume exceeding 0.55 cc/g; and wherein less than 7.5% of the total pore volume of said support material is contained in pore having a pore diameter greater than 350 Å.

(Appeal Br. 12 (paragraphing added)).

## II. REJECTION ON APPEAL

Claims 1 and 4–11 stand rejected under 35 U.S.C. § 103(a) (pre-AIA) as unpatentable over Soled et al.<sup>3</sup> (“Soled”) in view of Lawson et al.<sup>4</sup> (“Lawson”) and Gabrielov et al.<sup>5</sup> (“Gabrielov”) (Ans. 4–15; Final Act. 3–10).

## III. DISCUSSION

The Appellant argues claims 1, 4, 9, and 10 as a group and adds some additional arguments under separate sub-headings for each of claims 5–8 and 11 (Appeal Br. 3–11). For claims 1, 4, 9, and 10, we confine our discussion to claim 1, which we select as representative pursuant to 37 C.F.R. § 41.37(c)(1)(iv). By this rule, claims 4, 9, and 10 stand or fall with claim 1. As for claims 5–8 and 11, we address any additional argument(s) to the extent that these claims have been separately argued in accordance with the rule.

**Claim 1.** The Examiner finds that Soled describes a hydroprocessing catalyst composition, which may be either a bulk or a heterogeneous (supported) catalyst composition, having many of the limitations recited in claim 1 (Ans. 4–5; Final Act. 3–4). The Examiner acknowledges, however,

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<sup>3</sup> US 2011/0294656 A1, published December 1, 2011.

<sup>4</sup> US 2005/0274646 A1, published December 15, 2005.

<sup>5</sup> US 2009/0038993 A1, published February 12, 2009.

that Soled does not disclose the support's physical properties such as pore diameter and pore volume (Ans. 5; Final Act. 4). Relying on Gabrielov, which was found to teach a support having particular pore characteristics in a similar hydroprocessing catalyst, the Examiner concludes that "it would have been obvious to one of ordinary skill in the art . . . to provide for a support having the pore size distribution of Gabrielov in the composition of Soled as the ordinary skilled artisan is aware of the impact of pore size on catalytic activity" (Ans. 5; Final Act. 4–5). The Examiner further relies on Lawson as additional evidence in establishing that a person having ordinary skill in the art would have been prompted to dry and calcine a support having characteristics that are similar to those recited in claim 1 prior to impregnation with active materials in producing Soled's supported catalyst composition (Ans. 5–6; Final Act. 5).

The Appellant's principal contention is that Soled is directed to a bulk mixed metal catalyst, not a supported heterogeneous catalyst as required by claim 1 (Appeal Br. 4). According to the Appellant, "Soled teaches bulk catalysts with little to no support and, in any case, the support is composited with metals of the bulk catalyst" and further teaches a binder (*id.* at 5). The Appellant argues that, therefore, a person having ordinary skill in the art would not have been motivated to form a supported catalyst (*id.*). In addition, the Appellant argues that Soled's catalyst is "significantly different" because it does not teach that a calcined support is impregnated with metals and then further calcined before an organic additive is incorporated into the metal-containing support as in the claimed invention (*id.*). Furthermore, the Appellant argues that, unlike Soled's catalyst composition, the claimed composition is not prepared by incorporating two

different organic compounds (an amine and a carboxylic acid) that are reacted to yield a reaction product retained within the composition (*id.* at 6). As for Gabrielov, the Appellant urges that a person having ordinary skill in the art would not have been motivated to combine the teachings in these references with those in Soled because “even as experts, Soled et al[.] argued in support of their application that ‘the teachings applicable to [supported catalysts] do not commend themselves to [bulk catalysts], as far as the skilled person is concerned.’” (*id.* (citing an excerpt from what appears to be Soled’s Reply filed November 5, 2013 in Application 13/150,662 (Evidence App.); italics omitted; alterations in original)). The Appellant advances similar arguments against Lawson (Appeal Br. 8).

The Appellant’s arguments fail to identify reversible error in the Examiner’s rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011).

Contrary to the Appellant’s belief, claim 1 reads on Soled’s bulk metal catalyst composition, which contains a minor amount of support material (Soled ¶ 38). *Cf. In re Baxter*, 656 F.2d 679, 686 (CCPA 1981) (“As long as one of the monomers in the reaction is propylene, any other monomer may be present, because the term ‘comprises’ permits the *inclusion* of other steps, elements, or materials.”).

In any event, Soled explicitly discloses a heterogeneous supported catalyst composition (Soled ¶ 38). Specifically, Soled describes an amide-containing catalyst precursor composition comprising at least one Group 6 metal (e.g., Mo and/or W) and at least one metal from Groups 8–10 (e.g., Co and/or Ni), and an amide-containing reaction product formed *in situ* from (i) a first organic compound containing at least one amine group and (ii) a second organic compound separate from the first compound and containing

at least one carboxylic acid group at a temperature from about 195°C to about 250°C (Soled ¶¶ 15, 18). Soled teaches that the amide-containing catalyst precursor composition is then sulfided to form a hydroprocessing catalyst composition, either alone or in combination with a binder such as silica or silica-alumina (*id.* ¶¶ 17, 67).

As discussed above, Soled teaches that either a bulk metal catalyst composition, which may contain a minor amount (e.g., about 20 wt.% or less) of a carrier or support, or a heterogeneous supported metal catalyst precursor composition may be produced (*id.* ¶¶ 15, 36, 38). When a heterogeneous supported catalyst is formed, Soled states that typically the catalyst system comprises a carrier or support onto which one or more catalytically active materials are deposited using an impregnation or coating technique (*id.* ¶ 38).

Thus, consistent with the Examiner's findings (Ans. 5, 6; Final Act. 4, 5–6), Soled's disclosure differs from the subject matter recited in claim 1 only in that the prior art reference does not describe (1) the specific method for producing the supported catalyst composition and (2) the physical characteristics of the support material. Notwithstanding these differences, we are in complete agreement with the Examiner that the claimed subject matter as a whole would have been obvious to a person having ordinary skill in the art.

As the Examiner explains (Ans. 5; Final Act. 5), a person having ordinary skill in the art would have been well aware that a support's physical characteristics (such as pore size) are important to the catalyst's properties such as its activity. The Appellant does not contend otherwise (Appeal Br. 3–9). Indeed, Lawson, for example, discusses the effects of pore size and

pore volume of the support on activity or selectivity towards specific hydrocarbons (Lawson ¶¶ 13–15, 29–34, 41–42). Lawson also teaches removing all of the water present in the support gel material by drying and/or calcining the gel to transform, e.g., silicate and aluminate species into silica-alumina (*id.* ¶¶ 38–39). Lawson discloses that the amorphous silica-alumina material in general has a surface area of greater than 300 m<sup>2</sup>/g, a mean pore diameter of preferably between about 2 to about 12 nm (20–120 Å), and a total pore volume of between 0.2 cc/g and 1.5 cc/g (*id.* ¶ 43). Furthermore, Gabrielov teaches a hydroprocessing catalyst composition that is similar to that disclosed in Soled and claimed by the Inventors, wherein, consistent with Soled’s generic instructions, Gabrielov describes impregnating active metal components on a dried and calcined support (Gabrielov ¶¶ 13–16, 19). Gabrielov teaches that the support material, after drying and calcining, has a surface area of 50–450 m<sup>2</sup>/g, a mean pore diameter of 50–200 Å, and a pore volume of 0.5–1.1 cc/g (*id.* ¶ 17).

Given the collective teachings found in these references, we conclude that a person having ordinary skill in the art would have been prompted to use the dried and calcined support having the physical characteristics taught in Gabrielov or Lawson to support Soled’s active metals and amide-containing reaction product based on the expectation that Gabrielov’s or Lawson’s support is optimized to have physical properties suitable for hydroprocessing and thus the resulting hydroprocessing catalyst would provide successful results. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007) (“[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”).



Although Soled does not mention drying and calcining the active metal impregnated support prior to impregnation of the amine compound and the carboxylic acid compound, Soled teaches heating the composition to a temperature from about 195°C to about 250°C to effect reaction of the compounds to an amide *in situ* (Soled ¶ 39). As the Examiner points out (Ans. 6–7; Final Act. 5–6), the patentability of the claimed catalyst composition depends on the composition itself—not the method by which it is produced. *Cf. In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985). Therefore, the burden of production was shifted to the Appellant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product, but that burden was not satisfied. *Id.* at 697–98.

We also find no persuasive merit in the Appellant’s argument that Soled’s catalyst composition differs from the claimed composition because Soled uses both an amine compound and a carboxylic acid compound. First, Soled teaches that the amine compound reacts with the carboxylic acid to form an amide compound (Soled ¶ 39), which is specifically recited in claim 1 as an “organic additive.” Second, the Appellant does not direct us to any language in claim 1 that would exclude the co-presence of a carboxylic acid with an organic additive that is an amine compound.

The Appellant’s position that arguments presented during the prosecution of the Soled application establish what a person having ordinary skill in the art would have understood at the time of the current invention—i.e., that supported catalysts would not have commended themselves to bulk catalysts to a person having ordinary skill in the art—is also without merit. First, Soled’s arguments were merely attorney arguments presented in a

different record to overcome a different rejection based on an entirely different evidentiary record (Evidence App.).<sup>6</sup> Second, the evidence in the current appeal now includes—within the realm of available prior art—Soled’s disclosure, which discloses a catalyst composition that may be either a bulk metal catalyst that may contain some support or a heterogeneous support catalyst.

**Claims 5–8 & 11.** The Appellant’s arguments for each of claims 5–8 and 11 do not include any new argument not already addressed and found unpersuasive for claim 1 (Appeal Br. 9–11). Therefore, we also sustain the rejection as maintained against claims 5–8 and 11 for the same reasons.

For these reasons, and those well-stated by the Examiner, we uphold the Examiner’s rejection as maintained against all claims on appeal.

#### IV. CONCLUSION

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 4–11	103(a)	Soled, Lawson, Gabrielov	1, 4–11	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

**AFFIRMED**

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<sup>6</sup> See, e.g., *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (“An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of obviousness.”).