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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ROGER K. LOTT

Appeal 2019-003422
Application 11/374,369
Technology Center 1700

Before N. WHITNEY WILSON, MERRELL C. CASHION, JR., and JANE E. INGLESE, *Administrative Patent Judges.*

WILSON, *Administrative Patent Judge.*

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's April 24, 2018 decision to finally reject claims 1–4, 6–8, 10–18, 23–25, 36–38, 40–42, 44–46, and 48–63 ("Final Act."). Claims 5, 9, 19–22, 26–35, 39, and 43 have been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

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[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Hydrocarbon Technology & Innovation, LLC (Appeal Br. 3).

CLAIMED SUBJECT MATTER

The claims are directed to a method and system for mixing a catalyst precursor with a heavy oil feedstock in advance of hydroprocessing the heavy oil feedstock to upgrade it (Abstract). The catalyst precursor is pre-mixed with a hydrocarbon diluent to form a diluted catalyst precursor (*id.*). The diluted catalyst precursor is then mixed with at least a portion of the heavy oil feedstock (*id.*). Claim 1, reproduced below from the Claims Appendix, is illustrative of the claimed subject matter:

> 1. A method for thoroughly mixing a catalyst precursor throughout a heavy oil feedstock prior to forming an active catalyst from the catalyst precursor *in situ* within the heavy oil feedstock, comprising:
>
> using a first continuous flow mixing apparatus, pre-mixing a stream of an oil soluble catalyst precursor with a stream of a hydrocarbon oil diluent below a decomposition temperature of the catalyst precursor so that the catalyst precursor is substantially homogeneously dispersed throughout the diluent to form a diluted catalyst precursor mixture stream and without decomposition of the catalyst precursor and formation of active catalyst particles, the catalyst precursor consisting essentially of metal ions complexed with organic anions, the hydrocarbon oil diluent having a boiling point of at least about 150°C, wherein the weight ratio of catalyst precursor to hydrocarbon oil diluent is between about 1:500 and about 1:1; and
>
> prior to heating to decompose the catalyst precursor and form active catalyst particles and using a second continuous flow mixing apparatus downstream from the first continuous flow mixing apparatus, mixing the diluted catalyst precursor mixture stream with a heavy oil feedstock stream having a viscosity greater than the viscosity of the catalyst precursor for a time period of about 0.005 second to about 20 seconds and below a temperature at which substantial decomposition of the catalyst precursor occurs to form a conditioned heavy oil feedstock stream in which the catalyst precursor is dispersed

> throughout the heavy oil feedstock stream prior to substantial decomposition of the catalyst precursor and formation of active catalyst particles and so as to provide from about 5 to about 500 ppm by weight of metal from the catalyst precursor within the heavy oil feedstock stream.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Cyr et al.	US 5,578,197	November 26, 1996
Que et al.	US 6,660,157 B2	December 9, 2003

REJECTION

Claims 1–4, 6–8, 10–18, 23–25, 36–38, 40–42, 44–46, and 48–63 are rejected under 35 U.S.C. §103 as unpatentable over Cyr in view of Que.

DISCUSSION

The Examiner finds that Cyr discloses a method comprising (a) mixing an oil soluble catalyst precursor, such as iron pentacarbonyl or molybdenum 2-ethyl hexanoate, with a diluent such that the catalyst precursor is dispersed throughout the diluent, and (b) mixing the diluted catalyst precursor with a heavy oil feedstock (Final Act. 3, citing Cyr, 3:10–22, 4:59–63). The Examiner acknowledges, *inter alia*, that "Cyr does not explicitly disclose wherein the catalyst precursor is dispersed throughout the diluent prior to mixing the diluted catalyst precursor with the heavy oil feedstock" (Final Act. 4). To address this, the Examiner states:

> Moreover, with respect to Applicant's limitation of dispersing the catalyst precursor in the diluent 'prior to' mixing the diluted catalyst precursor with the heavy oil feedstock, the court has long held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results.

(Final Act. 4–5, citations omitted).[2]

We have reviewed Appellant's arguments as set forth in the Appeal Brief and Reply Brief, as well as the findings and contentions set forth in the Examiner's Final Office Action and Answer, and determine that the preponderance of the evidence of record supports Appellant's argument that Cyr, either alone or in combination with Que, does not teach or suggest the two-step process recited in the claims.

Cyr specifically states that in its method "dispersion is therefore preferably achieved in a distinct step prior to heating to additive decomposition or hydrocracking temperature, by *mixing the heavy oil plus additive plus diluent mixture* . . . . " (Cyr, 5:27–30, emphasis added). Although, as noted by this passage and articulated by the Examiner (Ans. 7), this is the "preferable" approach – and hence not the only approach– is it apparent that the alternative approach (i.e., non-preferred) is not the two-step method set forth in the appealed claims, but instead is the complete omission of the diluent:

> When the diluent was omitted from the combination, or the diluent was not a good solvent of asphaltenes or when stripping of light ends was not sufficient, experimental runs showed significant coke deposition. It is to be understood however that diluent addition is only a preferred feature.

(Cyr, 5:21–26). Thus, we determine that the preponderance of evidence of record supports a finding that Cyr does not teach a two-

[2] The Examiner makes additional findings and determinations based on Que that address different limitations in the claim not disclosed by Cyr. These findings and determinations are not germane to our disposition of this appeal and, therefore, neither they nor Appellant's arguments pertaining to them are addressed in this decision.

step approach in which the catalyst precursor is mixed with the diluent prior to mixing with the heavy oil feedstock.

Thus, the rejection rests on a conclusion that it would have been obvious to separate the one-step process taught by Cyr into two separate steps, as set forth in the independent claims on appeal. In this regard, the Examiner relies on case law which states that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results (Final Act. 4–5, citing *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959) and *In re Burhans*, 154 F. 2d 690 (CCPA 1946); and Ans. 6).

However, in this instance, we agree with Appellant (Reply Br. 3–4) that its process is not a simple reordering of steps relative to Cyr's process, but instead involves a different process, in which a different intermediate composition (the diluted catalyst precursor mixture stream recited in claim 1) is formed, an intermediate composition which is never present in Cyr. Cyr does not teach or suggest this additional step, which has, according to the claims and the Specification, the added benefit of allowing for full mixture of the catalyst precursor in the heavy oil feedstock in a short period of time (no more than 20 seconds). By contrast, Cyr's system appears to require from 20 minutes to 24 hours to achieve the requisite amount of mixing (Cyr 9:55–67; 10:4–12).

Accordingly, we conclude that the preponderance of evidence of record does not support the obviousness rejection over Cyr in view of Que.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–4, 6–8, 10–18, 23–25, 36–38, 40–42, 44–46, and 48–63	103	Cyr, Que		1–4, 6–8, 10–18, 23–25, 36–38, 40–42, 44–46, and 48–63

REVERSED