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THE WEBB LAW FIRM, P.C. ONE GATEWAY CENTER 420 FT. DUQUESNE BLVD, SUITE 1200 PITTSBURGH, PA 15222			STEIN, MICHELLE	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EDWARD N. COPPOLA,
SANJAY NANA, and CHARLES RED JR.

Appeal 2020-004038
Application 14/595,968
Technology Center 1700

Before BEVERLY A. FRANKLIN, DONNAM. PRAISS, and
JANE E. INGLESE, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner's decision to reject claims 1–19, 21–23, and 34–36. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ In this Decision, we refer to the Specification filed Jan. 13, 2015 (“Spec.”), the Final Office Action dated July 12, 2019 (“Final Act.”), the Appeal Brief filed Dec. 11, 2019 (“Appeal Br.”), the Examiner’s Answer dated Mar. 9, 2020 (“Ans.”), and the Reply Brief filed May 8, 2020 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Applied Research Associates, Inc. is identified as the real party in interest. Appeal Br. 3.

STATEMENT OF THE CASE

The invention relates to a high-efficiency process and system for converting high-pour-point, high-melting-point petroleum or synthetic organic feedstock into upgraded crude or fuel products that exhibit good low-temperature properties (cloud point, pour point, and viscosity) and improved transportability. Spec. ¶ 2. The Specification describes waxy crude oils exhibit high-pour-points (greater than 110°F), are semi-solid at ambient temperatures, and require heated trucks or train cars, or heated pipelines for transport to markets outside the local area. *Id.* ¶ 3. The Specification further describes heated waxy crude oils present a safety problem since they exhibit flash points close to their pour point. *Id.* According to the Specification, solutions to the transportation problems have focused mostly on the use of additives to reduce the pour point. *Id.* ¶ 4.

Claim 1, reproduced below, is illustrative of the subject matter on appeal (disputed limitations italicized).

1. A continuous flow process for converting a high-pour-point organic feedstock to an upgraded product comprising:
 - providing a high-pour-point organic feedstock;
 - feeding the high-pour-point organic feedstock into a separation system to produce a distillate fraction and a bottoms fraction;
 - feeding the bottoms fraction from the separation system into a hydrothermal reactor system operating at supercritical water conditions and turbulent flow having a Reynolds number of at least 2000 to produce an upgraded bottoms fraction; and*
 - feeding at least a portion of the upgraded bottoms fraction back into the separation system used to separate the

high-pour point organic feedstock to form the upgraded product.

Appeal Br. 29 (Claims Appendix).

ANALYSIS

We review the appealed rejections for error based upon the issues Appellant identifies, and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”). After considering the argued claims in light of the case law presented in this Appeal and each of Appellant’s arguments, we are persuaded of reversible error in the appealed rejections.

The Examiner rejects claims 1–19, 21–23, and 34–36 as follows. Final Act. 3–9.

Claims Rejected	35 U.S.C. §	References/Basis
1, 3, 5–8, 10–12, 15–19, 21, 34	103	Espinoza, ³ Choi ⁴ (evidenced by Henderson ⁵), He ⁶ (evidenced by Green ⁷)
4, 9, 22	103	Espinoza, Choi (evidenced by Henderson), He (evidenced by Green), Berkowitz ⁸

³ US 2006/0016722 A1, published Jan. 26, 2006.

⁴ US 2009/0145805 A1, published June 11, 2009.

⁵ US 2005/0131082 A1, published June 16, 2005.

⁶ US 2008/0099374 A1, published May 1, 2008.

⁷ US 4,135,982, issued Jan. 23, 1979.

⁸ US 2007/0056881 A1, published Mar. 15, 2007.

Claims Rejected	35 U.S.C. §	References/Basis
13, 14	103	Espinoza, Choi evidenced by Henderson, He evidenced by Green, Davis ⁹
2, 35, 36	103	Espinoza, Choi evidenced by Henderson, He evidenced by Green, Yarbrow ¹⁰

Each of the rejections is based on the same modification of Espinoza with Choi (as evidenced by Henderson) and He (as evidenced by Green). Thus, the dispositive issue in this appeal is whether the Examiner's modification of Espinoza's process with Choi's supercritical water conditions and He's turbulent flow is supported by reasoning having rational underpinnings. Conclusory statements are insufficient to merit an obviousness rejection; "instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Appellant argues modification of Espinoza would render Espinoza unsatisfactory for its intended purpose. Appeal Br. 16. With regard to the Examiner's modification with Choi's supercritical water conditions to reduce coke formation and pour point of the waxy feedstock (Final Act. 4), Appellant points out (1) Espinoza already quenches the thermal cracker effluent at the reaction chamber outlet to stop the cracking reaction to prevent excessive coke formation and (2) increasing the pressure in Espinoza's thermal cracking environment would increase the reaction of

⁹ US 4,536,283, issued Aug. 20, 1985.

¹⁰ US 2013/0206645 A1, published Aug. 15, 2013.

olefins and aromatics formed during the reaction, increase the coke yield, and reduce distillate yield. Appeal Br. 16–17 (citing Espinoza ¶¶ 60, 61); Reply Br. 2. Modification with He’s turbulent flow, Appellant contends, would result in undesired backmixing, which Espinoza seeks to avoid with internal baffles. Appeal Br. 17–18 (citing Espinoza ¶ 61); Reply Br. 2–4. Appellant additionally contends that He does not teach operating at the claimed Reynolds number of at least 2000, and Appellant provides calculations and the Declaration of co-inventor Edward N. Coppola signed June 20, 2019 (“Decl.”) to show (1) He’s examples operate at a low Reynolds Number and (2) He’s reactor cannot be realistically operated at turbulent flow of at least Reynolds number 2000. Appeal Br. 18–22 (citing He ¶¶ 44, 54; Decl. Tables 2, 3); Reply Br. 4–8 (citing He ¶¶ 44, 54; Decl. Tables 2, 3).

The Examiner’s response does not adequately address Appellant’s arguments regarding the modification of Espinoza’s process with Choi’s supercritical water conditions and He’s turbulent flow. The Examiner finds Espinoza’s teaching that the thermal cracking may be “accomplished by any suitable thermal cracking process” suggests modification with Choi’s thermal cracking, which Choi, in turn, teaches produces substantial amounts of coke that can be diminished by using hot pressurized supercritical water fluid. Ans. 9 (citing Espinoza ¶ 60; Choi ¶¶ 12, 13, 42). The Examiner’s response does not adequately explain why a skilled artisan would modify Espinoza’s process with (1) a thermal cracking process that produces substantial amounts of coke and (2) a process for reducing coke when Espinoza already teaches quenching the thermal cracker effluent to prevent excessive coke formation. The Examiner also does not adequately explain

why a skilled artisan would modify Espinoza's process with turbulent flow in view of Espinoza's teaching to reduce backmixing. Espinoza ¶ 61 ("Modern reaction chambers for thermal cracking are equipped with internals so as to reduce backmixing effects, thus maximizing the viscosity reduction."). Therefore, we find the preponderance of the evidence supports Appellant's position that modification of Espinoza with the teachings of Choi and He is not adequately supported with reasoning and would render Espinoza unsuitable for its intended purpose.

The Examiner's response also does not adequately address Appellant's evidence that He does not disclose or suggest turbulent flow having a Reynolds number of at least 2000. Appellant provides sufficient evidence and explanation to show that neither He's examples nor He's disclosed parameters teach or suggest operating at the claimed Reynolds number of at least 2000. Appeal Br. 18–23; Reply Br. 4–8; Decl. Even if the flow disclosed by He can be characterized as "turbulent" (Ans. 10 citing He claim 7), the term "turbulent" does not adequately disclose or suggest the claimed flow having a Reynolds number of at least 2000. The Examiner questions Appellant's evidence with respect to He not limiting reactor diameter to 0.25 inches or 0.5 inches. Ans. 10. Appellant responds that He discloses use of a spiral tube, therefore, the maximum diameter that can be configured into a spiral tube is 0.25 to 2 inches. Reply Br. 5. Appellant adequately explained the basis for He's reactor diameter range in the Appeal Brief. Appeal Br. 20.

The Examiner also questions Appellant's evidence directed to a residence time of 30 minutes whereas He teaches residence times of one minute to 6 hours. Ans. 10. Appellant points to the Declaration's Tables 2

and 3 (reproduced in both the Appeal and Reply Briefs) including operating parameters at a Reynolds number of 2000 at one minute and 360 minutes residence time (the residence time parameters He discloses) and across the nominal reactor diameters ranging from 0.25 inch to 2 inches. Reply Br. 5–8; Appeal Br. 20–23. Thus, Appellant’s evidence is not limited to He’s working examples, but encompasses data across He’s disclosed parameters from which a person having ordinary skill in the art would have been able to determine the limitations of He’s system design with respect to flow rate.

Accordingly, we reverse the Examiner’s rejections of claims 1–19, 21–23, and 34–36 under 35 U.S.C. § 103 over the combination of Espinoza, Choi, and He together with secondary references.

CONCLUSION

For these reasons and those the Appellant provides, we reverse the Examiner’s rejections of claims 1–19, 21–23, and 34–36 under 35 U.S.C. § 103.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed
1, 3, 5–8, 10–12, 15–19, 21, 34	103	Espinoza, Choi, Henderson, He, Green		1, 3, 5–8, 10–12, 15–19, 21, 34
4, 9, 22	103	Espinoza, Choi, Henderson, He, Green, Berkowitz		4, 9, 22
13, 14	103	Espinoza, Choi, Henderson, He, Green, Davis		13, 14
2, 35, 36	103	Espinoza, Choi, Henderson, He, Green, Yarbro		2, 35, 36
Overall Outcome				1–19, 21–23, 34–36

REVERSED