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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CAROLYN PARKS HUBBARD, ROBERT WALTER MCCABE, EVA THANASIU, DAVID KARL BIDNER, JAMES MICHAEL KERNS, NIAN XIAO, HELMUT HANS RUHLAND, MORITZ KLAUS SPRINGER, THOMAS LORENZ, GEORG LOUVEN, and JEFFREY SCOTT HEPBURN

Appeal 2015-007393
Application 12/638,633[1]
Technology Center 3700

Before JEFFREY A. STEPHENS, CARL L. SILVERMAN, and FREDERICK C. LANEY, *Administrative Patent Judges*.

LANEY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Carolyn Parks Hubbard et al. (Appellants) appeal under 35 U.S.C. § 134(a) from the Examiner's non-final decision (mailed June 18, 2014, hereinafter "Non-Final Act.") rejecting claims 1–7.[2] We have jurisdiction over this appeal under 35 U.S.C. § 6(b). An oral hearing was held on August 7, 2017.

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[1] According to Appellants, the real party in interest is Ford Global Technologies, LLC. Appeal Br. 3 (filed Dec. 22, 2014).

[2] Claims 8, 9, 11–14, and 16–19 have been withdrawn. Appeal Br. 23–25 (Claims App.). Claims 10 and 15 have been canceled. *Id.* at 24–25.

We REVERSE.

INVENTION

Appellants' invention relates to "the field of automotive emission control systems and methods." Spec. 1.

Claim 1, reproduced below, is independent and is representative of the claimed invention.

> 1. A method for adjusting fuel supplied to a spark ignited engine, comprising:
>
> providing a first air-fuel mixture that repeatedly cycles between rich and lean conditions, said first air-fuel mixture substantially stoichiometric on average over a number of cylinder cycles while not actively regenerating a particulate filter during a first operating condition; and
>
> providing a second air-fuel mixture that repeatedly cycles between rich and lean conditions, said second air-fuel mixture lean of stoichiometry on average over a number of cylinder cycles while actively regenerating said particulate filter during a second operating condition, said second operating condition different from said first operating condition.

Appeal Br. 21 (Claims App.).

REJECTIONS

I. The Examiner rejected claims 1, 2, and 4 under 35 U.S.C. § 103(a) as unpatentable over Najt (US 2010/0139248 A1, pub. June 10, 2010), Pott (DE 19801815 A1, pub. July 22, 1999), and Shirakawa (US 6,993,901 B2, iss. Feb. 7, 2006).

II. The Examiner rejected claim 3 under 35 U.S.C. § 103(a) as unpatentable over Najt, Pott, and Kidokoro (US 2008/0173008 A1, pub. July 24, 2008).

III. The Examiner rejected claims 4 and 5 under 35 U.S.C. § 103(a) as unpatentable over Najt, Pott, Pfaeffle (US 8,015,805 B2, iss. Sept. 13, 2011), and Fujiwara (US 2010/0192543 A1, pub. Aug. 5, 2010).

IV. The Examiner rejected claim 6 under 35 U.S.C. § 103(a) as unpatentable over Najt, Pott, Fujiwara, Cleary (US 8,001,768 B2, iss. Aug. 23, 2011), Williams (US 7,930,880 B2, iss. Apr. 26, 2011), and Wills (US 7,263,825 B1, iss. Sept. 4, 2007).

V. The Examiner rejected claim 7 under 35 U.S.C. § 103(a) as unpatentable over Najt, Pott, and Hebbale (US 8,392,091 B2, iss. Mar. 5, 2013).

ANALYSIS

Rejection I

At the core of Appellants' argument is that the Examiner has improperly determined the prior art discloses providing air-fuel mixtures that repeatedly cycle between rich and lean conditions during first and second operating conditions *of a particulate filter*, wherein the first air-fuel mixture is substantially stoichiometric on average over a number of cylinder cycles *while not actively regenerating* and the second air-fuel mixture is lean of stoichiometry on average over a number of cylinder cycles *while actively regenerating*, as claim 1 recites. Appeal Br. 8–14. Appellants argue, "the determination of the optimum or workable ranges of [the] variables may not be characterized as routine experimentation in view of the cited references" because a skilled artisan did not recognize "actively regenerating a particulate filter should include an air-fuel mixture that repeatedly cycles

between rich and lean conditions (said air-fuel mixture lean of stoichiometry on average over a number of cylinder cycles)." *Id.* at 13.

Although citing paragraph 35 of Najt as disclosing the recited limitations for the first operating condition and paragraph 33 as disclosing the recited limitations for the second operating condition, the Examiner finds "Najt does not describe *the fine details* of the air fuel ratio movement." Non-Final Act. 2–3 (emphasis added). The Examiner nevertheless asserts, "repeatedly cycling above and below a target air fuel ratio is the conventional way an engine operates (due to feedback control)," which Pott discloses. *Id.* at 3 (citing Pott, Fig. 3). As a result, the Examiner finds it is "apparent (or at least an obvious mode to implement)" Najt repeatedly cycles between rich and lean conditions during a first operating condition. *Id.* Furthermore, "[s]till looking at Pott," the Examiner finds it discloses "varying degrees of leanness or richness, some of which do not cycle about stoichiometry (figs 1 and 5, which are very rich/lean) and some which do (figs 2 and 4, which are only slightly rich/lean)." *Id.* Shirakawa, the Examiner further finds, "discloses the same principles as Najt and discloses that the fuel mode during regeneration is '*slightly lean*.'" *Id.* (citing Shirakawa, Abstract). Based on this evidence, the Examiner concludes,

> [i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to provide wherein the second air fuel mixture (the lean one) is only slightly lean, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Id. (citing *In re Aller*, 220 F.2d 454 (CCPA 1955)).

In filling in the "finer details," the Examiner erred by failing to explain why the cycling air-fuel mixture that Pott discloses for regenerating

NO_x storage would have led a skilled artisan to try the same technique to regenerate *a particulate filter*, which claim 1 specifically recites. Additionally, despite recognizing appropriately that Pott discloses a variety of operating modes (including modes that don't cycle between rich and lean), the Examiner does not provide any evidence or technical reasoning to explain why a skilled artisan would have recognized the compatibility of Pott's teachings to particulate filters. We agree with the Examiner that Najt and Shirakawa establish it was known to use a lean air/fuel mixture ratio, which may fluctuate above and below the target lean ratio (i.e., the *overall* ratio is lean), but this fact alone fails to support a finding that the fluctuation includes *cycling between rich and lean conditions*. Moreover, the Examiner has not persuasively shown any recognition by a skilled artisan that adjusting the cycles of air/fuel mixture, as opposed to adjusting the target air/fuel mixture itself, had any direct effect on the operation of a particulate filter and, thus, was a recognized results-effective variable.

As a result, the Examiner's obviousness determination of claim 1 in view of Najt, Pott, and Shirakawa lacks a rational underpinning. Instead, the Examiner's rejection simply amounts to a mere identification in the prior art of each of the elements of claim 1, which is insufficient to defeat the patentability of the claimed combination as a whole. *In re Kahn*, 441 F.3d 977, 986 (Fed. Cir. 2006). Therefore, we do not sustain the rejection of claim 1, and claims 2 and 4, which depend therefrom.

Rejections II–V

In Rejections II–V, which address claims 3–7 depending from claim 1, the Examiner incorporates the errors discussed above (*see supra* Rejection

I). *See* Final Act. 3–6. The Examiner does not rely on any of the additionally cited references to correct those errors. *See id.* Therefore, for the same reasons, we also do not sustain the Examiner's rejection of claims 3–7.

DECISION

The Examiner's rejection of claims 1–7 as unpatentable is reversed.

REVERSED