

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY,
Petitioner,

v.

PAICE LLC & THE ABELL FOUNDATION, INC.,
Patent Owner.

Case IPR2014-00904
Patent 7,237,634 B2

Before SALLY C. MEDLEY, KALYAN K. DESHPANDE, and
CARL M. DEFRANCO, *Administrative Patent Judges*.

DEFRANCO, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Ford Motor Company (“Ford”) filed a Petition (“Pet.”) for *inter partes* review of claims 1, 14, 16, 18, and 24 of U.S. Patent No. 7,237,634 B2 (“the ’634 patent”), which is owned by Paice LLC & The Abell Foundation, Inc. (collectively, “Paice”). In a preliminary proceeding, we decided to institute trial (“Dec. Inst.”) because Ford demonstrated a reasonable likelihood that the challenged claims are unpatentable under 35 U.S.C. § 103. In due course, Paice filed a Patent Owner Response (“PO Resp.”), and Ford followed with a Reply (“Reply”). Having heard oral argument on this matter,¹ and pursuant to our jurisdiction under 35 U.S.C. § 6(c), we determine Ford has proven, by a preponderance of the evidence, that claims 1, 14, 16, 18, and 24 are unpatentable

II. BACKGROUND

A. *The ’634 Patent*²

The ’634 patent describes a hybrid vehicle with an internal combustion engine, at least one electric motor, and a battery bank, all controlled by a microprocessor that controls the direction of torque between the engine, motor, and drive wheels of the vehicle. Ex. 1001, 17:17–56, Fig. 4. The microprocessor monitors the vehicle’s instantaneous torque requirements, or road load, to determine the source of torque necessary to propel the vehicle, be it the engine, the motor, or both. *Id.* at 11:63–65.

¹ A transcript (“Tr.”) has been entered into the record. Paper 39.

² The ’634 patent is also the subject of co-pending district court actions, including *Paice, LLC v. Ford Motor Co.*, No. 1:14-cv-00492 (D. Md., filed Feb. 19, 2014), and *Paice LLC v. Hyundai Motor Co.*, No. 1:12-cv-00499 (D. Md., filed Feb. 16, 2012). Pet. 1; PO Resp. 6. We are informed that, in the latter action, a jury trial was completed on October 1, 2015, and the parties are currently engaged in post-trial briefing.

Aptly, the '634 patent describes the vehicle's various modes of operation as an engine-only mode, an all-electric mode, or a hybrid mode. *Id.* at 35:63–36:55, 37:24–38:8.

In summarizing the invention, the '634 patent states that the microprocessor selects the appropriate mode of operation “in response to evaluation of the road load, that is, the vehicle's instantaneous torque demands and input commands provided by the operator of the vehicle.”³ *Id.* at 17:40–45. More specifically, “the microprocessor can effectively determine the road load by monitoring the response of the vehicle to the operator's command for more power.” *Id.* at 37:42–49. “[T]he torque required to propel the vehicle [i.e., road load] varies as indicated by the operator's commands.” *Id.* at 38:9–11. For example, the microprocessor “monitors the rate at which the operator depresses pedals [for acceleration and braking] as well as the degree to which [the pedals] are depressed.” *Id.* at 27:26–38. These operator input commands are provided to the microprocessor “as an indication that an amount of torque” from the engine “will shortly be required.” *Id.* at 27:41–57.

The microprocessor then compares the vehicle's torque requirements against a predefined “setpoint” and uses the results of the comparison to determine the vehicle's mode of operation. *Id.* at 40:16–49. The microprocessor may utilize a control strategy that runs the engine only in a range of high fuel efficiency, such as when the torque required to drive the vehicle, or road load (RL), reaches a setpoint (SP) of approximately 30% of

³ The '634 patent contrasts the claimed invention to prior control strategies “based solely on speed,” which are “incapable of responding to the operator's commands, and will ultimately be unsatisfactory.” Ex. 1001, 13:39–42.

the engine's maximum torque output (MTO). *Id.* at 20:61–67, 37:24–44; *see also id.* at 13:64–65 (“the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently”). The microprocessor also may monitor other operating parameters to control the vehicle's mode of operation, such as the battery's state of charge and the operator's driving history over time. *Id.* at 19:63–20:3; *see also id.* at 37:20–23 (“according to one aspect of the invention, the microprocessor 48 controls the vehicle's mode of operation at any given time in dependence on ‘recent history,’ as well as on the instantaneous road load and battery charge state”). According to the '634 patent, this microprocessor control strategy maximizes fuel efficiency and reduces pollutant emissions of the hybrid vehicle. *Id.* at 15:55–58.

B. The Challenged Claims

Of the challenged claims, claim 1 is the only independent and claims 14, 16, 18, and 24 depend therefrom. Claim 1 recites:

1. A hybrid vehicle, comprising:
 - one or more wheels;
 - an internal combustion engine operable to propel the hybrid vehicle by providing torque to the one or more wheels;
 - a first electric motor coupled to the engine;
 - a second electric motor operable to propel the hybrid vehicle by providing torque to the one or more wheels;
 - a battery coupled to the first and second electric motors, operable to: provide current to the first and/or the second electric motors; and accept current from the first and second electric motors; and
 - a controller, operable to control the flow of electrical and mechanical power between the engine, the first and the second electric motors, and the one or more wheels;

wherein the controller is operable to operate the engine when torque required from the engine to propel the hybrid

vehicle and/or to drive one or more of the first or the second motors to charge the battery is at least equal to a setpoint (SP) above which the torque produced by the engine is efficiently produced, and wherein the torque produced by the engine when operated at the SP is substantially less than the maximum torque output (MTO) of the engine.

Ex. 1001, 58:2–27 (emphasis added).

C. *The Decision to Institute*

In the preliminary proceeding, we instituted *inter partes* review on a single ground, determining Ford had shown a “reasonable likelihood” that claims 1, 14, 16, 18, and 24 are unpatentable as obvious over Severinsky,⁴ Field,⁵ and SAE 1996.⁶ Dec. Inst. 9–12. We now decide whether Ford has proven the unpatentability of these claims by a “preponderance of the evidence.” 35 U.S.C. § 316(e).

III. ANALYSIS

A. *Claim Construction*

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). This standard involves determining the ordinary and customary meaning of the claim terms as understood by one of ordinary skill in the art reading the patent’s entire written disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed.

⁴ U.S. Patent No. 5,343,970, iss. Sept. 6, 1994 (Ex. 1003, “Severinsky”).

⁵ PCT Int’l Pub. WO 93/23263 Nov. 25, 1993 (Ex. 1039, “Field”).

⁶ Kozo Yamaguchi et al., *Development of a New Hybrid System – Dual System*, SAE SPECIAL PUBLICATION SP-1156, pub. Feb. 1996 (Ex. 1025, “SAE 1996”).

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