

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 IPR2015-00799
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

Paice LLC & The Abell Foundation, Inc. (collectively, “Paice”) are the owners of U.S. Patent No. 7,237,634 B2 (“the ’634 patent”). Ford Motor Company (“Ford”) filed a Petition for *inter partes* review of the ’634 patent, challenging the patentability of claims 81–90, 115–124, 162–171, and 216–225 under 35 U.S.C. § 103. Paper 2 (“Pet.”). In a preliminary proceeding, we instituted an *inter partes* review because Ford made a threshold showing of a “reasonable likelihood” that the challenged claims are unpatentable. Paper 11 (“Dec.”).

Subsequent to institution, Paice filed a Patent Owner Response (Paper 14, “PO Resp.”), and Ford followed with a Reply (Paper 16, “Reply”).¹ An oral hearing was held on June 28, 2016, and a transcript of the hearing is included in the record. Paper 29 (“Tr.”). After reviewing the evidence and arguments of the parties, and pursuant to our jurisdiction under 35 U.S.C. § 6, we conclude Ford has proven, by a preponderance of the evidence, that claims 81–90, 115–124, 162–171, and 216–225 are unpatentable.

II. BACKGROUND

A. *Related Cases*

The ’634 patent, which includes over 300 claims, has previously been before us, having been the subject of multiple petitions filed by Ford for *inter partes* review (“IPR”). Aside from this case, the IPRs on which we have instituted trial include IPRs 2014-00904, 2014-1416, 2015-606, 2015-00722, 2015-00758, 2015-00784, 2015-00785, 2015-00787, 2015-00790,

¹ In addition, Paice filed a Motion for Observation on Cross-Examination (Paper 21) and Ford filed a Response to Motion for Observation on Cross-Examination (Paper 24), both of which have been considered.

2015-00791, 2015-00800, and 2015-00801. And, with this decision today, we have rendered final decisions in all of these IPRs, many of which include some overlap in terms of claims challenged or prior art asserted or both.² Indeed, the challenged claims in the instant IPR stem from independent claims that are the subject of a final determination of unpatentability in the related -1416 IPR, namely, independent claims 80, 114, 161, and 215. The challenged claims are also the subject of a final decision in the -758 IPR, only on different grounds.

The '634 patent is also the subject of litigation in two co-pending district court actions, *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. 3.

B. The '634 Patent

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 directs the transfer of torque between the engine, the motor, and the drive wheels of the vehicle. Ex. 1961, 17:17–56, Fig. 4. The microprocessor determines whether to operate the engine, the motor, or both, in response to “road load,” that is, the instantaneous torque required to drive the vehicle. *Id.* at 12:42–46. The microprocessor “can effectively determine the road load by monitoring the response of the vehicle to the operator’s command for more power.”³ *Id.* at 37:42–49. The operator

² *Ford Motor Co. v. Paice, LLC*, IPR2014-01416, 2016 WL 932948 (PTAB Mar. 10, 2016) (Paper 26). This final decision is currently on appeal at the U.S. Court of Appeals for the Federal Circuit.

³ The '634 patent contrasts the claimed invention to prior control strategies “based solely on speed,” which are “incapable of responding to the

commands include “the rate at which the operator depresses [accelerator and brake] pedals 69 and 70 as well as the degree to which [they] are depressed.” *Id.* at 27:26–38, Figs. 3, 4. The microprocessor uses information from the operator commands “as an indication that an amount of torque . . . will shortly be required.” *Id.* at 27:41–57.

The microprocessor then compares the vehicle’s torque requirements against a predefined “setpoint,” or “SP,” and uses the results of the comparison to determine the vehicle’s mode of operation, e.g., straight-electric, engine-only, or hybrid. *Id.* at 40:16–49. The microprocessor utilizes a hybrid control strategy that operates the engine only in a range of high fuel efficiency, which occurs when the instantaneous torque required to drive the vehicle, or road load (RL), reaches a setpoint (SP) of approximately 30% of the engine’s maximum torque output (MTO). *Id.* at 20:61–67; *see also id.* at 13:64–65 (“the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently”). In other words, when the road load is above 30% of the engine’s maximum torque output, the vehicle operates in an engine-alone mode. *Id.* at 37:42–44. When the road load is below 30% of the engine’s maximum torque, the vehicle operates in a straight-electric mode. *Id.* at 37:24–28. Operating the engine in a range above the setpoint but below the engine’s maximum torque output maximizes fuel efficiency and reduces pollutant emissions of the vehicle. *Id.* at 15:55–58.

operator’s commands, and will ultimately be unsatisfactory.” Ex. 1961, 13:39–42.

C. The Challenged Claims

All of the challenged claims stem from independent claims that are unchallenged by the instant Petition, but have already been determined to be unpatentable in our final decision in the -1416 IPR, as mentioned above. *See supra* n.2. Specifically, claims 81–90 depend from claim 80; claims 115–124 depend from claim 114; claims 162–171 depend from claim 161; and claims 216–225 depend from claim 215. Each of the independent claims, from which the challenged claims depend, requires a hybrid control strategy that compares “road load” of the vehicle to a “setpoint” in order to determine whether to operate the engine or the motor or both.

Common to all of the challenged claims is that they combine the hybrid control strategy from the independent claims, with additional limitations requiring that the energy⁴ supplied from the battery be at a specific “maximum DC voltage” and a specific “maximum current.” For instance, a first set of claims relates to maximum voltage from the battery: “the maximum DC voltage is at least approximately 500 volts” (the “maximum voltage” limitations). A second set of claims relates to maximum current, requiring that it be “less than approximately 150 amperes” (the “maximum current” limitations). And a third set of claims requires that “a ratio of maximum DC voltage to maximum current supplied is at least 2.5” (the “ratio” limitation). In analyzing the claims, we refer to these voltage, current, and ratio limitations, collectively, as the “electrical limitations.”

⁴ Some of the claims speak in terms of “power” from the battery in place of “energy” from the battery. In the context of these claims, the difference is irrelevant. *See* Ex. 1962 ¶¶ 263–264.

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