

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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FORD MOTOR COMPANY,  
Petitioner,

v.

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

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Case IPR2015-00787  
Patent 7,237,634 B2

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

MEDLEY, *Administrative Patent Judge*.

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

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we dismiss the *inter partes* review with respect to claim 215 and determine that Petitioner has shown by a preponderance of the evidence that claims 238, 241, 252–256,

259, 261, 262, 267, 281, 282, 285, 287, and 288 of U.S. Patent No. 7,237,634 B2 are unpatentable.

#### *A. Procedural History*

Petitioner, Ford Motor Company, filed a Petition requesting an *inter partes* review of claims 33, 34, 35, 38, 53, 54, 215, 238, 241, 252–256, 259, 261, 262, 267, 281, 282, 285, 287, and 288 of U.S. Patent No. 7,237,634 B2 (Ex. 1750, “the ’634 patent”). Paper 1 (“Pet.”). Patent Owner, Paice LLC & The Abell Foundation, Inc., filed a Preliminary Response in both unredacted and redacted forms. Papers 9, 10 (“Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, on October 26, 2015, we instituted an *inter partes* review of claims 215, 238, 241, 252–256, 259, 261, 262, 267, 281, 282, 285, 287, and 288, pursuant to 35 U.S.C. § 314. Paper 12 (“Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 17 (“PO Resp.”)) and Petitioner filed a Reply (Paper 25 (“Pet. Reply”)).<sup>1</sup> An oral hearing was held on June 28, 2016, and a transcript of the hearing is included in the record (Paper 34 (“Tr.”)).

#### *B. Related Proceedings*

The ’634 patent is involved in *Paice LLC v. Ford Motor Co.*, No. 1-14-cv-00492, filed on February 19, 2014, in the United States District Court for the District of Maryland. Pet. 2. Petitioner twice filed an earlier Petition for *inter partes* review of the ’634 patent, and we instituted trial in

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<sup>1</sup> In addition, Patent Owner filed a Motion for Observation on Cross-Examination (Paper 27) and Petitioner filed a Response to Motion for Observation on Cross-Examination (Paper 30), both of which have been considered.

both proceedings and subsequently entered final written decisions. *Ford Motor Co. v. Paice LLC & The Abell Foundation, Inc.*, Case IPR2014-00904 (Papers 13 and 41), and *Ford Motor Co. v. Paice LLC & The Abell Foundation, Inc.*, Case IPR2014-01416 (Papers 9 and 26). The '634 patent also is involved in the following *inter partes* review proceedings: IPR2015-00606, IPR2015-00722, IPR2015-00758, IPR2015-00784, IPR2015-00785, IPR2015-00790, IPR2015-00791, IPR2015-00799, IPR2015-00800, and IPR2015-00801.

### C. The '634 Patent (Ex. 1750)

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 torque transfer between the engine, the motor, and the drive wheels of the vehicle. Ex. 1750, 17:17–56, Fig. 4. The microprocessor compares the vehicle's torque requirements and the engine's torque output against a predefined setpoint and uses the results of the comparison to control 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”). Operating the engine in a range above the setpoint but substantially less than the maximum torque output maximizes fuel efficiency and reduces pollutant emissions of the vehicle. *Id.* at 15:55–58.

*D. Illustrative Claims*

Petitioner challenges independent claim 215 and dependent claim 238, which depends directly from claim 215. Petitioner also challenges independent claim 241 and dependent claims 252–256, 259, 261, and 262, which depend either directly or indirectly from claim 241. Petitioner also challenges independent claim 267 and dependent claims 281, 282, 285, 287, and 288, which depend either directly or indirectly from claim 267.

Claims 215 and 241 are reproduced below:

215. A method for controlling a hybrid vehicle, comprising:

determining instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command;

operating at least one electric motor to propel the hybrid vehicle when the RL required to do so is less than a setpoint (SP);

operating an internal combustion engine of the hybrid vehicle to propel the hybrid vehicle when the RL required to do so is between the SP and a maximum torque output (MTO) of the engine, wherein the engine is operable to efficiently produce torque above the SP, and wherein the SP is substantially less than the MTO; and

operating both the at least one electric motor and the engine to propel the hybrid vehicle when the torque RL required to do so is more than the MTO; and

regeneratively charging a battery of the hybrid vehicle when instantaneous torque output of the engine > the RL, when the RL is negative, and/or when braking is initiated by an operator of the hybrid vehicle.

Ex. 1750, 79:10–31.

241. A method for controlling a hybrid vehicle, comprising:  
determining instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command;  
operating at least one electric motor to propel the hybrid vehicle when the RL required to do so is less than a setpoint (SP);  
operating an internal combustion engine of the hybrid vehicle to propel the hybrid vehicle when the RL required to do so is between the SP and a maximum torque output (MTO) of the engine, wherein the engine is operable to efficiently produce torque above the SP, and wherein the SP is substantially less than the MTO; and  
operating both the at least one electric motor and the engine to propel the hybrid vehicle when the torque RL required to do so is more than the MTO; and  
controlling said engine such that combustion of fuel within the engine occurs substantially at a stoichiometric ratio, wherein said controlling the engine comprises limiting a rate of change of torque output of the engine; and  
if the engine is incapable of supplying instantaneous torque required to propel the hybrid vehicle, supplying additional torque from the at least one electric motor.

*Id.* at 81:33–58.

Independent claim 267 is similar in scope to claim 215 except it does not include the “regeneratively charging a battery of the hybrid vehicle” language. Instead, that claim adds “rotating the engine before starting the engine such that its cylinders are heated by compression of air therein.” *Id.* at 84:10–11.

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