

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 IPR2015-00791
Patent 7,237,634 B2

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 claims 80, 93, 99, 114, 127, 132, 139, and 215, and determine that Petitioner has shown by a preponderance of the evidence

that claims 94, 96, 106–108, 113, 128, 140, 141, 146, 229, and 231 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, 37, 39–41, 80, 93, 94, 96, 99, 106–108, 113, 114, 127, 128, 132, 139–141, 146, 215, 229, and 231 of U.S. Patent No. 7,237,634 B2 (Ex. 1450, “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 27, 2015, we instituted an *inter partes* review of claims 80, 93, 94, 96, 99, 106–108, 113, 114, 127, 128, 132, 139–141, 146, 215, 229, and 231, 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”)).¹ 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

¹ 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, IPR2015-00787, IPR2015-00790, IPR2015-00799, IPR2015-00800, and IPR2015-00801.

C. The '634 Patent (Ex. 1450)

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. 1450, 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 80 and dependent claims 93, 94, 96, 99, 106–108, and 113 which depend either directly or indirectly from claim 80. Petitioner also challenges independent claim 114 and dependent claims 127, 128, 132, 139–141, and 146, which depend either directly or indirectly from claim 114. Petitioner also challenges independent claim 215 and dependent claims 229 and 231, which depend directly from claim 215. Independent claims 80, 114, and 215 are reproduced below:

80. A method for controlling a hybrid vehicle, comprising:
- determining instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command;
 - monitoring the RL over time;
 - 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
 - wherein said operating the internal combustion engine to propel the hybrid vehicle is performed when: the $RL > SP$ for at least a predetermined time; or the $RL > SP2$, wherein the SP2 is a larger percentage of the MTO than the SP; 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.

Id. at 65:11–33.

114. A method for controlling a hybrid vehicle, comprising:
determining instantaneous road load (RL) required to propel the hybrid vehicle responsive to an operator command;
monitoring the RL over time;
operating at least one electric motor to propel the hybrid vehicle when the RL required to do so is less than a setpoint (SP);
wherein said operating the at least one electric motor to propel the hybrid vehicle is performed when the $RL < SP$ for at least a predetermined amount of time;
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.

Id. at 68:34–55.

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 $> RL$, when

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