

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 and THE ABELL FOUNDATION, INC.,  
Patent Owner.

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Case IPR2015-00795  
Patent 7,104,347 B2

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

DESHPANDE, *Administrative Patent Judge*.

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

## I. INTRODUCTION

### A. Background

Ford Motor Company (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–5, 14, 16, 19, 20, and 22 of U.S. Patent No. 7,104,347 B2 (Ex. 1301, “the ’347 patent”). Paper 1 (“Pet.”). Paice LLC and The Abell Foundation, Inc. (collectively, “Patent Owner”) filed a Preliminary Response in unredacted and redacted forms. Papers 9, 10 (“Prelim. Resp.”). Patent Owner also filed a Motion to Seal. Paper 11 (“Motion to Seal”).

Pursuant to 35 U.S.C. § 314, we instituted *inter partes* review of the ’347 patent, on November 2, 2015, under 35 U.S.C. § 103(a), as to claims 1 and 5 as obvious over Ibaraki ’882<sup>1</sup> and Koide;<sup>2</sup> claims 3 and 4 as obvious over Ibaraki ’882, Koide, and Frank;<sup>3</sup> claim 16 as obvious over Ibaraki ’882, Koide, and Kawakatsu;<sup>4</sup> claim 20 as obvious over Ibaraki ’882, Koide, and Vittone;<sup>5</sup> claim 19 as obvious over Ibaraki ’882, Koide, and Yamaguchi;<sup>6</sup>

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<sup>1</sup> U.S. Patent No. 5,789,882, issued Aug. 4, 1998 (Ex. 1303) (“Ibaraki ’882”).

<sup>2</sup> U.S. Patent No. 5,934,395, issued Aug. 10, 1999 (Ex. 1317) (“Koide”).

<sup>3</sup> U.S. Patent No. 6,116,363, issued Sept. 12, 2000 (Ex. 1318) (“Frank”).

<sup>4</sup> U.S. Patent No. 4,335,429, issued June 15, 1982 (Ex. 1305) (“Kawakatsu”).

<sup>5</sup> Oreste Vittone, *Fiat Conceptual Approach to Hybrid Cars Design*, 12TH INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM (1994) (Ex. 1320) (“Vittone”).

<sup>6</sup> U.S. Patent No. 5,865,263, issued Feb. 2, 1999 (Ex. 1321) (“Yamaguchi”).

claim 22 as obvious over Ibaraki '882, Koide, and Ibaraki '626;<sup>7</sup> and claim 14 as obvious over Ibaraki '882, Koide, and Lateur.<sup>8</sup> Paper 12 (“Dec.”). We did not institute *inter partes* review of claim 2 as obvious over Ibaraki '882 and Koide. Dec. 21–22.

Patent Owner filed a Response (Paper 16, “PO Resp.”), and Petitioner filed a Reply (Paper 21, “Pet. Reply”).<sup>9</sup> Oral hearing was held on June 28, 2016, and the hearing transcript has been entered in the record. Paper 30 (“Tr.”).

The Board has jurisdiction 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. Pursuant to our jurisdiction under 35 U.S.C. § 6, we conclude, *first*, that Petitioner is estopped from maintaining its challenge in this proceeding against claim 1. For the reasons discussed below, we are persuaded that Petitioner has shown by a preponderance of the evidence that claims 3–5, 14, 16, 19, 20, and 22 of the '347 patent are unpatentable.

#### *B. Related Proceedings*

Petitioner indicates that the '347 patent is the subject of *Paice, LLC and The Abell Foundation, Inc. v. Ford Motor Company*, Case No. 1-14-cv-00492 and *Paice LLC and The Abell Foundation, Inc. v. Hyundai Motor*

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<sup>7</sup> U.S. Patent No. 6,003,626, issued Dec. 21, 1999 (Ex. 1322) (“Ibaraki '626”).

<sup>8</sup> U.S. Patent No. 5,823,280, issued Oct. 20, 1998 (Ex. 1307) (“Lateur”).

<sup>9</sup> In addition, Patent Owner filed a Motion for Observation on Cross-Examination (Paper 23) and Petitioner filed a Response to Motion for Observation on Cross-Examination (Paper 26), both of which have been considered.

IPR2015-00795  
Patent 7,104,347 B2

*America et. al.*, Case No. 1:2012-cv-00499. Pet. 1; Paper 5, 2. Petitioner also indicates that the '347 patent was the subject of IPR2014-00571, IPR2014-00579, and IPR2014-00884, in which final decisions have been issued. *Id.*; Paper 5, 3. Petitioner further indicates that patents related to the '347 patent are the subject matter of IPR2014-00570, IPR2014-01415, IPR2014-00568, IPR2014-00852, IPR2014-00875, IPR2014-00904, IPR2014-01416, IPR2015-00606, IPR2015-00767, IPR2015-00722, IPR2015-00758, IPR2015-00784, IPR2015-00785, IPR2015-00791, IPR2015-00787, IPR2015-00790, IPR2015-00794, and IPR2015-00792. *Id.* at 1–2; Paper 5, 3.

### *C. The '347 Patent*

The '347 patent describes a hybrid vehicle with an internal combustion engine, two electric motors (a starter motor and a traction motor), and a battery bank, all controlled by a microprocessor that directs the transfer of torque from the engine and traction motor to the drive wheels of the vehicle. Ex. 1301, 17:5–45, Fig. 4. The microprocessor features a control strategy that runs the engine only under conditions of high efficiency, typically when the vehicle's instantaneous torque requirements (i.e., the amount of torque required to propel the vehicle, or "road load") are at least equal to 30% of the engine's maximum torque output ("MTO") capability. *Id.* at 20:52–60, 35:5–14; *see also id.* at 13:47–61 ("the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently").

Running the engine only when it is efficient to do so leads to improved fuel economy and reduced emissions. *Id.* at 13:47–52. To achieve such efficiency, the hybrid vehicle includes various operating modes that

depend on the vehicle's torque requirements, the battery's state of charge, and other operating parameters. *Id.* at 19:53–55. For example, the hybrid vehicle may operate in: (1) an all-electric mode, where only the traction motor provides the torque to propel the vehicle and operation of the engine would be inefficient (i.e., stop-and-go city driving); (2) an engine-only mode, where only the engine provides the torque to propel the vehicle and the engine would run at an efficient level (i.e., highway cruising); (3) a dual-operation mode, where the traction motor provides additional torque to propel the vehicle beyond that already provided by the engine and the torque required to propel the vehicle exceeds the maximum torque output of the engine (i.e., while accelerating, passing, and climbing hills); and (4) a battery recharge mode where the engine operates a generator to recharge the battery while the traction motor drives the vehicle. *Id.* at 35:66–36:58, 37:26–38:55.

*D. Illustrative Claim*

Petitioner challenges claims 1–5, 14, 16, 19, 20, and 22 of the '347 patent. Pet. 4–60. Claim 1 is illustrative of the claims at issue and is reproduced below:

1. A hybrid vehicle, comprising:
  - an internal combustion engine controllably coupled to road wheels of said vehicle;
  - a first electric motor connected to said engine and [sic] operable to start the engine responsive to a control signal;
  - a second electric motor connected to road wheels of said vehicle, and operable as a motor, to apply torque to said wheels to propel said vehicle, and as a generator, for accepting torque from at least said wheels for generating current;
  - a battery, for providing current to said motors and accepting charging current from at least said second motor; and

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