

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT &  
BMW OF NORTH AMERICA, LLC,

Petitioner,

v.

PAICE LLC & THE ABELL FOUNDATION, INC.,

Patent Owner.

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IPR2020-00994  
Patent 7,104,347 B2

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Before SALLY C. MEDLEY, KALYAN K. DESHPANDE, and  
ARTHUR M. PESLAK, *Administrative Patent Judges*.

PESLAK, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

*35 U.S.C. § 318(a); 37 C.F.R. § 42.71*

Denying-in-Part and Dismissing-in-Part Petitioner's Motion to Exclude

*37 C.F.R. § 42.64*

## I. INTRODUCTION

Bayerische Motoren Werke Aktiengesellschaft and BMW of North America, LLC (collectively “Petitioner” or “BMW”) filed a Petition (Paper 1) and, with our permission, filed a Corrected Petition (Paper 11, “Pet.”) requesting an *inter partes* review of claims 2, 11, 17, 24, 33, and 38 of U.S. Patent 7,104,347 B2 (Ex. 1001, “the ’347 patent”). Petitioner submitted the Declaration of Dr. Gregory W. Davis in support of the Petition. Ex. 1008 (“Davis Decl.”). Paice LLC and the Abell Foundation, Inc. (collectively “Patent Owner” or “Paice”) filed a Preliminary Response (Paper 13, “Prelim. Resp.”). Taking into account the arguments presented in Patent Owner’s Preliminary Response, we determined that there was a reasonable likelihood that Petitioner would prevail in its contention that at least one of the challenged claims of the ’347 patent is unpatentable under 35 U.S.C. § 103(a). On November 19, 2020, we instituted *inter partes* review as to the challenged claims and all grounds presented in the Petition. Paper 19. (“Dec.”).

During the course of trial, Patent Owner filed a Patent Owner Response. Paper 22. (“PO Resp.”). Patent Owner also filed a Declaration of Dr. Mahdi Shahbakhti in support of its response. Ex. 2016 (“Shahbakhti Decl.”). Petitioner filed a Reply to Patent Owner’s Response. Paper 28 (“Pet. Reply”). In support of its Reply, Petitioner submitted a Reply Declaration of Dr. Gregory W. Davis. Ex. 1088 (“Davis Reply Decl.”). Patent Owner filed a Sur-reply. Paper 34 (“Sur-reply”). An oral hearing was held on August 25, 2021 and a transcript of the hearing has been entered into the record. Paper 47 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the challenged

claims of the '347 patent. For the reasons discussed below, we determine Petitioner establishes by a preponderance of the evidence that claims 2, 11, 17, 24, 33, and 38 of the '347 patent are unpatentable.

*A. Related Matters*

The '347 patent is currently at issue in *Paice LLC v. Bayerische Motoren Werke Aktiengesellschaft*, 1:19-cv-03348-SAG (D. Md.). Paper 4, 2. The '347 patent was subject to review in IPR2014-00571, IPR2014-00579, IPR2014-00884, IPR2015-00794, IPR2015-00795, IPR2017-00227, IPR2017-00226, and IPR2016-00272. Pet. 72–73. Final Written Decisions were issued in IPR2014-00571, IPR2014-00579, IPR2014-00884, IPR2015-00794, and IPR2015-00795. Ex. 1003; Ex. 1004; Ex. 1006; Ex. 1010. The Federal Circuit affirmed the Board's Final Written Decisions. Ex. 1005; Ex. 1007.

*B. Real Parties in Interest*

Petitioner and Patent Owner state that the named entities are the only real parties in interest. Pet. 72; Paper 4, 2.

*C. The '347 Patent (Ex. 1001)*

The '347 patent issued on September 12, 2006, and is titled "Hybrid Vehicles." Ex. 1001, codes (45), (54). The '347 patent issued from U.S. Patent Application 10/382,577 filed March 7, 2003. *Id.* at codes (21), (22).

The '347 patent is directed to hybrid vehicles comprising an internal combustion engine, a traction motor, and a battery bank and are controlled by a microprocessor so that the engine runs only under high efficiency conditions in response to the vehicle's torque requirements. *Id.* at code (57).

Figure 4 of the '347 patent, reproduced below, illustrates the drive system of a hybrid vehicle:

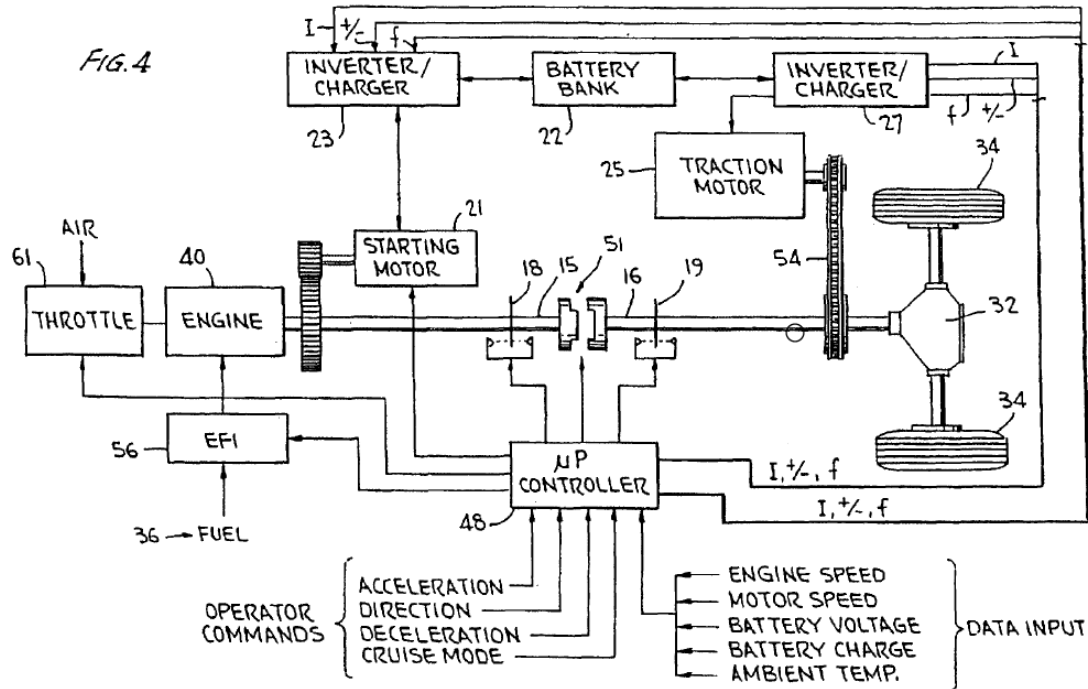


Figure 4 is “a block diagram of the principal components of the drive system” of an embodiment of the hybrid vehicle of the '347 patent. *Id.* at 22:15–16. As shown in Figure 4, the drive system includes internal combustion engine 40, starting motor 21, traction motor 25, battery bank 22, and microprocessor 48. *Id.* at 17:5–45. The microprocessor features an engine 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”) is 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 13:47–51. 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. Prior Art and Asserted Grounds*

Petitioner asserts that claims 2, 11, 17, 24, 33, and 38 would have been unpatentable on the following grounds<sup>1</sup>:

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<sup>1</sup> The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. Because the ’347 patent was filed before the effective date of the relevant amendment, the pre-AIA version of § 103 applies.

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