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Paper 12
Entered: September 30, 2014

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 IPR2014-00579
Patent 7,104,347 B2

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

DEFRANCO, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Ford Motor Company ("Ford") filed a Petition requesting an *inter partes* review of claims 1, 7, 8, 18, 21, 23, and 37 of U.S. Patent No. 7,104,347 B2 ("the '347 patent"). Paper 1 ("Pet."). The owner of the '347 patent, Paice LLC & The Abell Foundation, Inc. ("Paice"), filed a Preliminary Response. Paper 11 ("Prelim. Resp.").[1] We have jurisdiction under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." After considering the Petition and the Preliminary Response, we conclude that Ford has demonstrated a reasonable likelihood that it would prevail in showing unpatentability of all the challenged claims. Thus, we authorize institution of an *inter partes* review of claims 1, 7, 8, 18, 21, 23, and 37 of the '347 patent.

II. BACKGROUND

A. The '347 Patent [2]

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

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[1] Paice filed both redacted and unredacted versions of its Preliminary Response. Papers 7, 11. Our decision cites to the redacted version, i.e., Paper 11, which is marked "Public."

[2] The '347 patent is also the subject of a co-pending case, *Paice, LLC et al. v. Ford Motor Company*, No. 1-14-cv-00492, filed Feb. 19, 2014, in the U.S. District Court for the District of Maryland. Pet. 1.

torque transfer between the engine, the motors, and the drive wheels of the vehicle. Ex. 1001, 17:5–45, Fig. 4. The hybrid vehicle features a hybrid control strategy that runs the engine only under conditions of high efficiency, typically when the vehicle's instantaneous torque demand (i.e., the amount of torque required to propel the vehicle at a desired speed) is at least equal to 30% of the engine's maximum torque output ("MTO"). *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 under efficient operating conditions leads to improved fuel economy and reduced emissions. *Id*. at 13:47–51. To achieve such efficiency, the hybrid vehicle includes different operating modes that depend on the vehicle's instantaneous torque demand, the battery's state of charge, and other operating parameters. *Id*. at 19:53–55. For example, the hybrid vehicle operates in: (1) an all-electric mode, where only the traction motor provides the torque to propel the vehicle, whenever 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, whenever the engine can run at an efficient level (i.e., highway cruising); (3) a hybrid mode, where the traction motor provides additional torque to propel the vehicle beyond that already provided by the engine, whenever the instantaneous torque demand 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; *see also id*. at 37:26–38:55.

B. Challenged Claims

Ford challenges independent claims 1 and 23. It also challenges dependent claims 7, 8, 18, and 21, which depend directly or indirectly from claim 1, and dependent claim 37, which depends from claim 23. Claim 1 is illustrative:

> 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 [a]nd 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
>
> a controller for controlling the flow of electrical and mechanical power between said engine, first and second motors, and wheels,
>
> wherein said controller starts and operates said engine when torque require[d] to be produced by said engine to propel the vehicle and/or to drive either one or both said electric motor(s) to charge said battery is at least equal to a setpoint (SP) above which said engine torque is efficiently produced, and wherein the torque produced by said engine when operated at said setpoint (SP) is substantially less than the maximum torque output (MTO) of said engine.

Ex. 1001, 58:13–37.

Independent claim 23 is directed to a "method" of controlling a hybrid vehicle. *Id*. at 60:22. Like claim 1, it recites an "internal combustion engine capable of efficiently producing torque at loads between a lower level SP [setpoint] and a maximum torque output MTO." *Id*. at 60:23–25. Unlike claim 1, however, claim 23 does not require *two* motors but simply recites "*one or more* electric motors" for providing output torque and generating electrical current. *Id*. at 60:25–27 (emphasis added).

C. Evidence of Record

As its basis for challenging the claims of the '347 patent, Ford relies upon five publications authored-in-part by J.R. Bumby (collectively, "the Bumby references"). Ford also proffers the Declaration of Dr. Gregory W. Davis (Ex. 1108).

References	Patents/Printed Publications	Date	Exhibit
Bumby I	J.R. Bumby et al., *Computer modelling of the automotive energy requirements for internal combustion engine and battery electric-powered vehicles*, IEE PROC., v. 132, pt. A, no. 5, 265–279	Sep. 1985	1103
Bumby II	J.R. Bumby and I. Forster, *Optimisation and control of a hybrid electric car*, IEE PROC., v. 134, pt. D, no. 6, 373–387	Nov. 1987	1104
Bumby III	I. Forster and J.R. Bumby, *A hybrid internal combustion engine/battery electric passenger car for petroleum displacement*, PROC. INST. MECH. ENGRS., v. 202, no. D1, 51–64	Jan. 1988	1105

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