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Paper 38
Entered: December 10, 2015

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 IPR2014-00884
Patent 7,104,347 B2

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

DEFRANCO, *Administrative Patent Judge.*

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

I. INTRODUCTION

Ford Motor Company ("Ford") filed a Petition ("Pet.") for *inter partes* review of claims 1, 7, 10, 21, 23, and 24 of U.S. Patent No. 7,104, 347 B2 ("the '347 patent"), which is owned by Paice LLC & The Abell Foundation, Inc. (collectively, "Paice"). In a preliminary proceeding, we decided to institute trial ("Dec. Inst.") because Ford demonstrated a reasonable likelihood that the challenged claims are unpatentable under 35 U.S.C. § 103. In due course, Paice filed a Patent Owner Response ("PO Resp."), and Ford followed with a Reply ("Reply"). Having heard oral argument on this matter,[1] and pursuant to our jurisdiction under 35 U.S.C. § 6(c), we determine Ford has proven that claims 1, 7, and 10 are unpatentable by a preponderance of the evidence, but has not carried its burden with respect to claim 24. Also, pursuant to 35 U.S.C. § 315(e)(1), we determine that Ford is estopped from maintaining its challenge against claims 21 and 23.

II. BACKGROUND

A. Related Proceedings

The instant Petition challenges several claims of the '347 patent that have been adjudicated previously in IPR2014-00571 and IPR2014-00579, but on different grounds. Specifically, those prior proceedings led to final written decisions in which claims 1, 7, 21, and 23 at issue here were determined to be unpatentable, among other claims of the '347 patent. *See* IPR2014-00571, Paper 44, 2015 WL 5782084 (PTAB Sept. 28, 2015); IPR2014-00579, Paper 45, 2015 WL 5782085 (PTAB Sep. 28, 2015).[2] We

[1] A transcript ("Tr.") has been entered into the record. Paper 36.
[2] Paice has filed notices of appeal from our final written decisions in the -571 and -579 proceedings.

granted institution of trial in the instant proceeding back in December 2014, well before our final written decisions in the -571 and -579 proceedings.

The '347 patent is also the subject of co-pending district court actions, including *Paice, LLC v. Ford Motor Co.*, No. 1:14-cv-00492 (D. Md., filed Feb. 19, 2014), and *Paice LLC v. Hyundai Motor Co.*, No. 1:12-cv-00499 (D. Md., filed Feb. 16, 2012). Pet. 1; *see also* PO Resp. 7–8 (referencing the district courts' claim construction). We are informed that, in the latter action, a jury trial was recently completed on October 1, 2015, and the parties are currently engaged in post-trial briefing.

B. The '347 Patent

The '347 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 controls the direction of torque between the engine, motor, and drive wheels of the vehicle. Ex. 1201, 17:5–45, Fig. 4. The microprocessor monitors the vehicle's instantaneous torque requirements, or road load, to determine the source of torque necessary to propel the vehicle, be it the engine, the motor, or both. *Id*. at 11:60–62. Aptly, the '347 patent describes the vehicle's various modes of operation as an engine-only mode, an all-electric mode, or a hybrid mode. *Id*. at 35:66–36:58, 37:26–38:11.

In summarizing the invention, the '347 patent states that the microprocessor selects the appropriate mode of operation "in response to evaluation of the road load, that is, the vehicle's instantaneous torque demands and input commands provided by the operator of the vehicle."[3] *Id*.

[3] The '347 patent contrasts the claimed invention to prior control strategies "based solely on speed," which are "incapable of responding to the

at 17:28–32. More specifically, "the microprocessor can effectively determine the road load by monitoring the response of the vehicle to the operator's command for more power." *Id*. at 37:44–51. "[T]he torque required to propel the vehicle [i.e., road load] varies as indicated by the operator's commands." *Id*. at 38:12–14. For example, the microprocessor "monitors the rate at which the operator depresses pedals [for acceleration and braking] as well as the degree to which [the pedals] are depressed." *Id*. at 27:21–34. These operator input commands are provided to the microprocessor "as an indication that an amount of torque" from the engine "will shortly be required." *Id*. at 27:36–53.

The microprocessor then compares the vehicle's torque requirements against a predefined "setpoint" and uses the results of the comparison to determine the vehicle's mode of operation. *Id*. at 40:20–55. The microprocessor may utilize a control strategy that runs the engine only in a range of high fuel efficiency, such as when the 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 20:52–60, 37:26–46; *see also id*. at 13:47–61 ("the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently"). The microprocessor may also monitor other operating parameters to control the vehicle's mode of operation, such as the battery's state of charge and the operator's driving history over time. *Id*. at 19:53–60; *see also id*. at 37:23–26 ("according to one aspect of the invention, the microprocessor 48 controls the vehicle's mode of operation at any given time in dependence on 'recent history,' as

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operator's commands, and will ultimately be unsatisfactory." Ex. 1201, 13:35–38.

well as on the instantaneous road load and battery charge state"). According to the '347 patent, this microprocessor control strategy maximizes fuel efficiency and reduces pollutant emissions of the hybrid vehicle. *Id*. at 15:48–50.

B. The Challenged Claims

Of the challenged claims, claims 1 and 23 are independent. Claim 1 requires *two* electric motors, while claim 23 requires simply *one or more* electric motors. Claim 1 is illustrative and recites:

> 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. 1201, 58:13–37.

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