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Paper 30
Entered: October 25, 2016

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 IPR2015-00792
Patent 8,214,097 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

Paice LLC & The Abell Foundation, Inc. (collectively, "Paice") are the owners of U.S. Patent No. 8,214,097 B2 ("the '097 patent"). Ford Motor Company ("Ford") filed a Petition for *inter partes* review of the '097 patent, challenging the patentability of claims 1, 3, 4, 7, 9, 11, 13, 14, 17, 19, 21, 23, 24, 27, 28, 30, 32, 33, 37, and 38 under 35 U.S.C. § 103. Paper 2 ("Pet."). In a preliminary proceeding, we instituted an *inter partes* review because Ford made a threshold showing of a "reasonable likelihood" that the challenged claims are unpatentable under 35 U.S.C. § 314. Paper 13 ("Dec.").

Subsequent to institution, Paice filed a Patent Owner Response (Paper 16, "PO Resp."), and Ford followed with a Reply (Paper 18, "Reply").[1] An oral hearing was held on June 28, 2016, and a transcript of the hearing is included in the record. Paper 29 ("Tr."). After reviewing the evidence and arguments of the parties, and pursuant to our jurisdiction under 35 U.S.C. § 6, we conclude, *first*, that Ford is estopped from maintaining its challenge in this proceeding against claims 1, 3, 4, 9, 11, 13, 14, 19, 21, 23, 24, 28, 30, 32, and 33, and, *second*, that Ford has proven, by a preponderance of the evidence, that remaining claims 7, 17, 27, 37, and 38 are unpatentable.

II. BACKGROUND

A. Related Cases

This is not the first time Ford has presented the '097 patent for *inter partes* review. A number of claims of the '097 patent were adjudicated

[1] In addition, Paice filed a Motion for Observation on Cross-Examination (Paper 22) and Ford filed a Response to Motion for Observation on Cross-Examination (Paper 25), both of which have been considered.

previously in IPR2014-00570 and IPR2014-01415, only on different grounds.[2] Specifically, the -570 proceeding led to final written decision of unpatentability for claims 30, 32, and 33 at issue here (2015 WL 5782083 (PTAB Sep. 28, 2015)), and the -1415 proceeding led to a final written decision of unpatentability for claims 1, 3, 4, 7, 9, 11, 13, 14, 19, 21, 23, 24, 28, and 30 (2016 WL 932941) (PTAB Mar. 10, 2016)). The -570 and -1415 decisions are currently on appeal at the U.S. Court of Appeals for the Federal Circuit.

The ’097 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. 2.

B. The ’097 Patent

The ’097 patent describes a hybrid vehicle with an internal combustion engine, an electric motor, and a battery bank, all controlled by a microprocessor that controls the direction of torque transfer between the engine, the motor, and the drive wheels of the vehicle. Ex. 1201, 16:61–17:5, Fig. 4. The microprocessor monitors the vehicle’s instantaneous torque requirements, also known as “road load (RL),” to determine whether to operate the engine, the electric motor, or both, to propel the vehicle. *Id*. at 11:50–52. The vehicle’s various modes of operation include an engine-only mode, an all-electric mode, or a hybrid mode. *Id*. at 35:14–36:4, 36:39–37:22.

[2] The earlier -570 and -1415 proceedings each included a number of claims from the ’097 patent not at issue here.

As summarized in the '097 patent, 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*. at 17:16–22. "[T]he microprocessor can effectively determine the road load by monitoring the response of the vehicle to the operator's command for more power." *Id*. at 36:57–64. "[T]he torque required to propel the vehicle [i.e., road load] varies as indicated by the operator's commands." *Id*. at 37:23–25. For example, the microprocessor "monitors the rate at which the operator depresses [accelerator and brake] pedals . . . as well as the degree to which [the] pedals . . . are depressed." *Id*. at 27:1–4. The microprocessor uses this information "as an indication that an amount of torque that can efficiently be provided by the engine . . . will shortly be required." *Id*. at 27:6–22.

The microprocessor then compares the vehicle's torque requirements against a predefined "setpoint (SP)" to determine whether to employ the engine. *Id*. at 36:39–37:21, 39:27–59. The microprocessor runs the engine only in a range of high fuel efficiency, such as when the vehicle's torque requirements, or road load (RL), reaches a setpoint (SP) of approximately 30% of the engine's maximum torque output (MTO). *Id*. at 20:37–45, 36:39–59; *see also id*. at 13:48–50 ("the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently"). The microprocessor also limits the rate of increase of the engine's torque output so that combustion of fuel occurs at a near stoichiometric air-fuel ratio. *See*,

[3] The '097 patent contrasts the claimed invention to prior control strategies "based solely on speed," which are "incapable of responding to the operator's commands, and will ultimately be unsatisfactory." Ex. 1201, 13:24–28.

e.g., *id*. at 27:31–35, 29:63–30:12, 37:2–6, 38:62–39:14. These control strategies have the effect of maximizing fuel efficiency and reducing carbon emissions of the vehicle. *Id*. at 15:38–41.

C. The Challenged Claims

Of the challenged claims, four are independent—claims 1, 11, 21, and 30. Claims 1, 11, and 21 relate to a method for controlling a hybrid vehicle, while claim 30 relates to the hybrid vehicle itself. Claim 1 is illustrative:

> 1. A method for controlling a hybrid vehicle, said vehicle comprising a battery, a controller, wheels, an internal combustion engine and at least one electric motor, wherein both the internal combustion engine and motor are capable of providing torque to the wheels of said vehicle, and wherein said engine has an inherent maximum rate of increase of output torque, said method comprising the steps of:
>
> operating the internal combustion engine of the hybrid vehicle to provide torque to operate the vehicle;
>
> operating said at least one electric motor to provide additional torque when the amount of torque provided by said engine is less than the amount of torque required to operate the vehicle; and
>
> employing said controller to control the engine *such that a rate of increase of output torque of the engine is limited* to less than said inherent maximum rate of increase of output torque, *and* wherein said step of controlling the engine such that the rate of increase of output torque of the engine is limited is performed *such that combustion of fuel within the engine occurs at a substantially stoichiometric ratio*; and comprising the further steps of:
>
> operating said internal combustion engine to provide torque to the hybrid vehicle *when the torque required to operate the hybrid vehicle is between a setpoint SP and a maximum torque output (MTO) of the engine, wherein the engine is operable to efficiently produce torque above SP*, and wherein SP is substantially less than MTO;

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