Trials@uspto.gov
571-272-7822

Paper 33
Entered: November 8, 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 IPR2015-00606
Patent 7,237,634 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. 7,237,634 B2 ("the '634 patent"). Ford Motor Company ("Ford") filed a Petition for *inter partes* review of the '634 patent, challenging the patentability of claims 56–65, 68–77, 242–251, 268–277, 292, 293, and 298 under 35 U.S.C. § 103. Paper 1 ("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. Paper 14 ("Dec.").

Subsequent to institution, Paice filed a Patent Owner Response (Paper 17, "PO Resp."), and Ford followed with a Reply (Paper 19, "Reply").[1] An oral hearing was held on June 28, 2016, and a transcript of the hearing is included in the record. Paper 31 ("Tr."). After reviewing the evidence and arguments of the parties, and pursuant to our jurisdiction under 35 U.S.C. § 6, we conclude Ford has proven, by a preponderance of the evidence, that claims 56–65, 68–77, 242–251, 268–277, 292, 293, and 298 are unpatentable.

II. BACKGROUND

A. Related Cases

The '634 patent, which includes over 300 claims, has previously been before us, having been the subject of multiple petitions filed by Ford for *inter partes* review ("IPR"). Aside from this case, the IPRs on which we have instituted trial include IPRs 2014-00904, 2014-1416, 2015-00722,

[1] In addition, Paice filed a Motion for Observation on Cross-Examination (Paper 23) and Ford filed a Response to Motion for Observation on Cross-Examination (Paper 26), both of which have been considered.

2015-00758, 2015-00784, 2015-00785, 2015-00787, 2015-00790, 2015-00791, 2015-00799, 2015-00800, and 2015-00801. And, with this decision today, we have rendered final decisions in all of these IPRs, many of which include some overlap in terms of claims challenged or prior art asserted or both.[2] The instant IPR, however, presents us with an entirely new set of claims, as well as a ground, that we have not previously seen.

The '634 patent is also the subject of litigation in two co-pending district court actions, *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. 3.

B. The '634 Patent

The '634 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 directs the transfer of torque between the engine, the motor, and the drive wheels of the vehicle. Ex. 1151, 17:17–56, Fig. 4. The microprocessor determines whether to operate the engine, the motor, or both, in response to "road load," that is, the instantaneous torque required to drive the vehicle. *Id*. at 12:42–46. The microprocessor "can effectively determine the road load by monitoring the response of the vehicle

[2] The earliest of these cases, the -904 and -1416 IPRs, led to final determinations of unpatentability, respectively, for claims 1, 14, 16, 18, and 24 (2015 WL 8536745 (PTAB Dec. 10, 2015)) and claims 80, 93, 98, 99, 102, 109, 114, 127, 131, 132, 135, 139, 142, 161, 215, 228, 232, 233, and 235–237 (2016 WL 932948) (PTAB Mar. 10, 2016)). These two IPRs are currently on appeal at the U.S. Court of Appeals for the Federal Circuit. We issued final decisions in the other IPRs more recently.

to the operator's command for more power."[3] *Id*. at 37:42–49. The operator commands include "the rate at which the operator depresses [accelerator and brake] pedals 69 and 70 as well as the degree to which [they] are depressed." *Id*. at 27:26–38, Figs. 3, 4. The microprocessor uses information from the operator commands "as an indication that an amount of torque . . . will shortly be required." *Id*. at 27:41–57.

The microprocessor then compares the vehicle's torque requirements against a predefined "setpoint," or "SP," and uses the results of the comparison to determine the vehicle's mode of operation, e.g., straight-electric, engine-only, or hybrid. *Id*. at 40:16–49. The microprocessor utilizes a hybrid control strategy that operates the engine only in a range of high fuel efficiency, which occurs when the instantaneous 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 20:61–67; *see also id*. at 13:64–65 ("the engine is never operated at less than 30% of MTO, and is thus never operated inefficiently"). In other words, when the road load is above 30% of the engine's maximum torque output, the vehicle operates in an engine-alone mode. *Id*. at 37:42–44. When the road load is below 30% of the engine's maximum torque, the vehicle operates in a straight-electric mode. *Id*. at 37:24–28. Operating the engine in a range above the setpoint but below the engine's maximum torque output maximizes fuel efficiency and reduces pollutant emissions of the vehicle. *Id*. at 15:55–58.

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[3] The '634 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. 1151, 13:39–42.

C. The Challenged Claims

Of the challenged claims, only two are independent—claims 292 and 298. Dependent claim 293 stems from independent claim 292, while the remainder of the challenged dependent claims stem from independent claims that are unchallenged by the instant Petition, but are the subject of several of the related IPRs mentioned above. Specifically,

> claims 56–65 depend from unchallenged claim 1, which is the subject of the -904 IPR;
>
> claims 68–77 depend from unchallenged claim 33, which is the subject of the -722, -787, and -791 IPRs;
>
> claims 242–251 depend from unchallenged claim 241, which is the subject of the -785, -787, and -801 IPRs; and
>
> claims 268–277 depend from unchallenged claim 267, which is the subject of the -787 and -801 IPRs.

Common to the challenged claims, except for claims 292, 293, and 298, is that they combine a hybrid control strategy that compares "road load" to a particular "setpoint" for determining when to operate the engine and motor,[4] with additional limitations requiring that energy[5] supplied from the battery be at a specific "maximum DC voltage" and a specific "maximum current." For instance, a first set of claims (*i.e.*, claims 57, 59, 62, 64, 69, 71, 74, 76, 243, 245, 248, 250, 269, 274, 276, and 292) relates to maximum voltage from the battery: "the maximum DC voltage is at least approximately 500 volts" (the "maximum voltage" limitations). A second

[4] Claims 292, 293, and 298 do not recite a "setpoint," but do utilize a hybrid control strategy that is responsive to "road load" for determining when to operate the engine and motor.

[5] Some of the claims speak in terms of "power" from the battery in place of "energy" from the battery. In the context of these claims, the difference is irrelevant. *See* Ex. 1152 ¶¶ 263–264.

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