

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 IPR2014-00570
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

Ford Motor Company (“Ford”) filed a Petition (“Pet.”) for *inter partes* review of claims 30–33, 35, 36, 38, and 39 of U.S. Patent No. 8,214,097 B2 (“the ’097 patent”), which is owned by Paice LLC & The Abell Foundation, Inc. (collectively, “Paice”). In a preliminary proceeding, we determined a reasonable likelihood existed that claims 30–33, 35, 36, and 39 are unpatentable under 35 U.S.C. § 103, and instituted trial of those claims, but we denied review of claim 38. As to the triable claims, Paice filed a Patent Owner Response (“PO Resp.”), and Ford followed with a Reply (“Reply”). After hearing oral argument from both parties,¹ and pursuant to our jurisdiction under 35 U.S.C. § 6(c), we conclude Ford has proven, by a preponderance of the evidence, that claims 30–33, 35, 36, and 39 are unpatentable.

II. BACKGROUND

A. *The ’097 patent*²

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 directs the transfer of torque from the engine and/or motor to the drive wheels of the vehicle. Ex. 1001, 17:5–45, Fig. 4. The microprocessor features a control strategy that limits the rate of increase of the engine’s output torque so that fuel combustion occurs near a stoichiometric air-fuel ratio. *Id.* at 37:2–42. By limiting the rate of

¹ A transcript (“Tr.”) has been entered into the record. Paper 43.

² The ’097 patent is also the subject of several co-pending cases, 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.

increasing engine torque and maintaining a near stoichiometric air-fuel mixture, the hybrid control strategy improves fuel economy and reduces undesirable emissions during starting and normal operation of the vehicle. *Id.* at 36:60–37:6, 38:62–39:14.

B. The challenged claims

Claim 30 is the only independent claim on review. Pet. 3. Claims 31, 32, 35, 36, and 39 depend directly, and claim 33 depends indirectly, from claim 30. Claim 30 recites:

30. A hybrid vehicle, comprising:

- one or more wheels;
- an internal combustion engine operable to propel the hybrid vehicle by providing torque to the one or more wheels, wherein said engine has an inherent maximum rate of increase of output torque;
- at least one electric motor operable to propel the hybrid vehicle by providing torque to the one or more wheels;
- a battery coupled to the at least one electric motor, operable to provide electrical power to the at least one electric motor; and
- a controller, operable to control the flow of electrical and mechanical power between the engine, the at least one electric motor, and the one or more wheels, responsive to an operator command;
- wherein said controller controls said at least one electric motor to provide additional torque when the amount of torque being provided by said engine is less than the amount of torque required to operate the vehicle; and
- wherein said controller controls said engine such that a rate of increase of output torque of said engine is limited to less than said inherent maximum rate of increase of output torque, and wherein the controller is operable to limit the rate of change of torque produced by the engine such that combustion of fuel within the engine occurs at a substantially stoichiometric ratio.

Ex. 1001, 60:4–29.

C. *The instituted grounds of unpatentability*

In the preliminary proceeding, we instituted trial because Ford made a threshold showing of a “reasonable likelihood” that claims 30, 31, 35, 36, and 39 were unpatentable as obvious over the combined teachings of Severinsky³ and Anderson;⁴ that claim 32 was unpatentable as obvious over the teachings of Severinsky, Anderson, and Yamaguchi;⁵ and that claim 33 was unpatentable as obvious over the teachings of Severinsky, Anderson, Yamaguchi, and Katsuno.⁶ Dec. to Inst. 10–12. We now decide whether Ford has proven the unpatentability of these same claims by a “preponderance of the evidence.” 35 U.S.C. § 316(e).

III. ANALYSIS

A. *Claim construction*

Ford asks that we construe the term, “rate of change,” as used in claim 30, to mean “rate of increase” because that construction is consistent with an amendment that was requested during prosecution but “mistakenly failed” to get processed, even though the amendment was made for other occurrences of the same term, “rate of change,” found elsewhere in the claim. Pet. 22–23. Without that construction, Ford argues, the term “rate of change” in claim 30 is left with “no antecedent basis.” *Id.* at 23. Paice does not oppose Ford’s proposed construction, and we see merit in such a construction. Thus, we conclude that the term “rate of change” is properly

³ U.S. Patent No. 5,343,970, iss. Sept. 6, 1994 (Ex. 1009, “Severinsky”).

⁴ C. Anderson & E. Pettit, *The Effects of APU Characteristics on the Design of Hybrid Control Strategies for Hybrid Electric Vehicles*, SAE TECHNICAL PAPER 950493 (1995) (Ex. 1006, “Anderson”).

⁵ U.S. Patent No. 5,865,263, iss. Feb. 2, 1999 (Ex. 1007, “Yamaguchi”).

⁶ U.S. Patent No. 4,707,984, iss. Nov. 24, 1987 (Ex. 1008, “Katsuno”).

construed to mean “rate of increase.” No other claim terms require an express construction for us to analyze the challenged claims relative to the asserted prior art.

B. Claims 30, 31, 35, 36, and 39—Obviousness over Severinsky and Anderson

Ford relies on Severinsky and Anderson as together teaching the limitations of claims 30, 31, 35, 36, and 39. Pet. 46–54. Ford also advances a reason why a skilled artisan would have combined their teachings to arrive at the claimed invention. *Id.* at 50–51. Specifically, like the claimed invention, Severinsky discloses the essential components of a hybrid electric vehicle, including an internal combustion engine, an electric motor, a battery, and a microprocessor for controlling operation of the engine and motor. *Compare* Ex. 1009, Fig. 3 (Severinsky) *with* Ex. 1001, Fig. 4 (the ’097 patent). Also, Severinsky teaches that “stoichiometric combustion” is important to “lower the toxic hydrocarbon and carbon monoxide emission” of the engine. Ex. 1009, 12:13–17.⁷

Acknowledging that Severinsky does not disclose achieving stoichiometric combustion by limiting the “rate of increase,” or “rate of change,” of the engine’s output torque, as required by claim 30, Ford relies on Anderson as teaching this limitation. Pet. 49–50 (citing Ex. 1006, 7). Notably, Anderson discloses a hybrid control strategy that “maintains the stoichiometric air fuel ratio” of the engine by limiting “engine starts and transients,” and more specifically, by performing “slow transients” so the

⁷ Ford’s declarant, Dr. Stein, whose testimony we credit, confirms the teachings of Severinsky with respect to the basic elements and functions recited by claim 30, i.e., the engine, motor, battery, and controller. Ex. 1002 ¶¶ 324–346.

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