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Paper 9
Entered: March 26, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY,
Petitioner,

v.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
Patent Owner.

IPR2020-00010
Patent 9,810,166 B2

Before KEN B. BARRETT, LYNNE H. BROWNE, and JAMES J. MAYBERRY, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Summary

Ford Motor Company ("Petitioner")[1] filed a Petition requesting *inter partes* review of U.S. Patent No. 9,810,166 B2 ("the '166 patent," Ex. 1101). Paper 2 ("Pet."). The Petition challenges the patentability of claims 1–5, 7, 8, 10–24, and 26–30 of the '166 patent. Massachusetts Institute of Technology ("Patent Owner")[2] filed a Preliminary Response to the Petition. Paper 7 ("Prelim. Resp.").

An *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a) (2018). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing in showing that at least one of the challenged claims of the '166 patent is unpatentable. Accordingly, we do not institute an *inter partes* review and the Petition is denied. Additionally and for the reasons set forth below, we exercise our discretion under 35 U.S.C. § 314(a) not to institute trial in this proceeding.

B. Related Proceedings

One or both parties identify, as matters involving or related to the '166 patent, *Ethanol Boosting Systems, LLC v. Ford Motor Company*,

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[1] Petitioner identifies Ford Motor Company as the real party-in-interest. Pet. 78.

[2] Patent Owner identifies "Massachusetts Institute of Technology, the Patent Owner, and Ethanol Boosting Systems, LLC, the Exclusive Licensee," as real parties-in-interest. Paper 8, 2.

Civil Action No. 1:19-cv-00196-CFC-SRF (D. Del.), *Ethanol Boosting Systems, LLC v. Ford Motor Company*, Appeal No. 2020-1472 (Fed. Cir.), and Patent Trial and Appeal Board case IPR2019-01399. Pet. 78–80; Paper 8, 2–6. The parties also identify, as involving challenges to related patents, IPR2019-01400 and IPR2020-00013 (US 8,069,839 B2), IPR2019-01401 and IPR2020-00011 (US 9,255,519 B2), and IPR2019-01402 and IPR2020-00012 (US 10,138,826 B2). Pet. 78; Paper 8, 2–3.

We instituted trial in IPR2019-01399, IPR2019-01401, and IPR2019-01402 and denied institution in IPR2019-01400. We, concurrently with the instant decision, are denying institution in IPR2020-00011, IPR2020-00012, and IPR2020-00013.

C. The '166 Patent

The '166 patent, titled "Fuel Management System for Variable Ethanol Octane Enhancement of Gasoline Engines," issued November 7, 2017, from an application filed March 20, 2017, and ultimately claims priority, through several continuation applications, to an application filed November 18, 2004. Ex. 1101, codes (54), (45), (22), (63). The '166 patent is directed "to spark ignition gasoline engines utilizing an antiknock agent which is a liquid fuel with a higher octane number than gasoline such as ethanol to improve engine efficiency." *Id.* at 1:35–38. Figure 1 of the '166 patent is reproduced below.

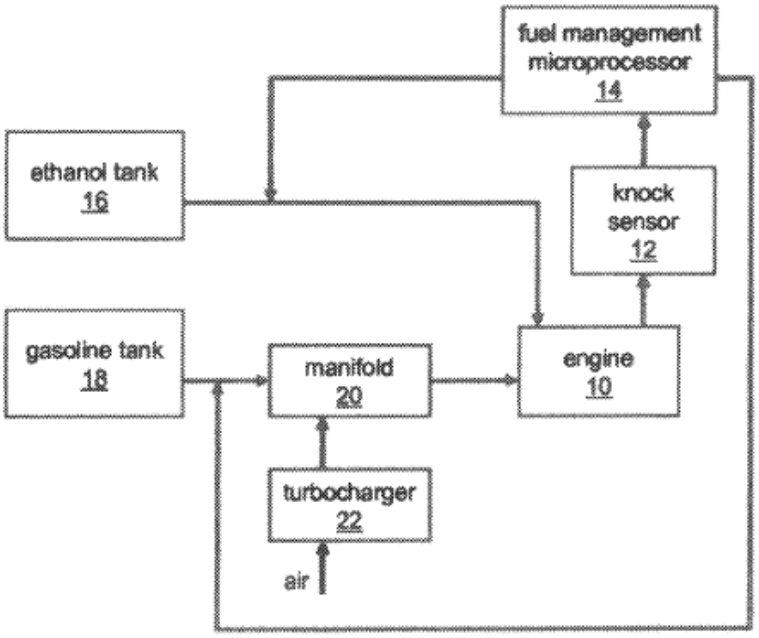

FIG. 1

Figure 1 depicts "a block diagram of one embodiment of the invention disclosed" in the '166 patent. *Id.* at 3:3–4. Spark ignition gasoline engine 10 includes knock sensor 12, fuel management microprocessor system 14, engine manifold 20, and turbocharger 22. *Id.* at 3:20–28. Ethanol tank 16 contains an anti-knock agent, such as ethanol, and gasoline tank 18 contains the primary fuel, such as gasoline. *Id.* at 3:22–27. Fuel management microprocessor system 14 controls the direct injection of the anti-knock agent into engine 10 and the injection of gasoline into engine manifold 20. *Id.* "The amount of ethanol injection is dictated either by a predetermined correlation between octane number enhancement and fraction of fuel that is provided by ethanol in an open loop system or by a closed loop control system that uses a signal from the knock sensor 12 as an input to the fuel management . . . microprocessor 14." *Id.* at 3:28–34. The fuel management system minimizes the amount of ethanol directly injected into the cylinder while still preventing engine knock. *Id.* at 3:34–36.

"Direct injection substantially increases the benefits of ethanol addition and decreases the required amount of ethanol. . . . Because ethanol has a high heat of vaporization there will be substantial cooling when it is directly injected into the engine 10," which "further increases knock resistance." *Id.* at 3:41–49. The amount of octane enhancement needed from the ethanol to prevent knocking is a function of the torque level. *Id.* at 6:4–15. In the embodiment of Figure 1, "port fuel injection of the gasoline in which the gasoline is injected into the manifold rather than directly injected into the cylinder is preferred because it is advantageous in obtaining good air/fuel mixing and combustion stability that are difficult to obtain with direct injection." *Id.* at 3:49–54.

D. Illustrative Claims

Of the challenged claims of the '166 patent, claims 1, 19, and 22 are independent claims. The remaining challenged claims depend directly or indirectly from one of those independent claims. Independent claims 1, 19, and 22, reproduced below, are illustrative.

> 1. A fuel management system for a spark ignition engine which utilizes port fuel injection and also utilizes direct fuel injection;
>
> and where there is a first torque range where direct injection and port injection are both used at the same value of torque throughout the first torque range
>
> and where in at least part of the first torque range as torque is increased the amount of fuel that is directly injected is changed so as to obtain knock-free operation and the amount of directly injected fuel used to provide knock-free operation is minimized.

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