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(54) **OPTIMIZED FUEL MANAGEMENT SYSTEM FOR DIRECT INJECTION ETHANOL ENHANCEMENT OF GASOLINE ENGINES**

(75) Inventors: **Leslie Bromberg**, Sharon, MA (US);
Daniel R. Cohn, Cambridge, MA (US);
John B. Heywood, Newton, MA (US)

(73) Assignee: **Massachusetts Institute of Technology**, Cambirdge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 31 days.

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(21) Appl. No.: **11/100,026**

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F02B 77/04 (2006.01)
(52) **U.S. Cl.** **123/198 A**
(58) **Field of Classification Search** 123/198 A,
123/406.29, 406.47, 435, 559.1, 25 C
See application file for complete search history.

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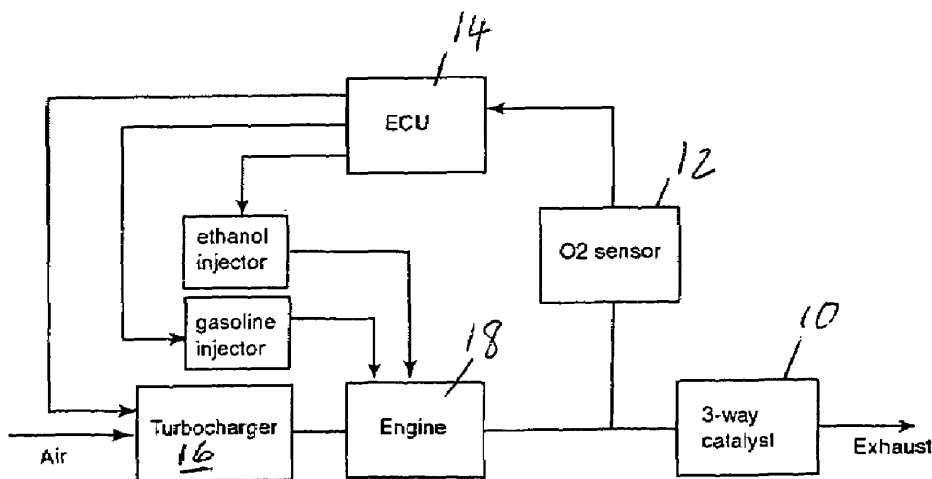
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Primary Examiner—Stephen K. Cronin
Assistant Examiner—Hyder Ali
(74) *Attorney, Agent, or Firm*—Sam Pastemack; Choate Hall & Stewart LLP

(57) **ABSTRACT**

Fuel management system for enhanced operation of a spark ignition gasoline engine. Injectors inject an anti-knock agent such as ethanol directly into a cylinder. It is preferred that the direct injection occur after the inlet valve is closed. It is also preferred that stoichiometric operation with a three way catalyst be used to minimize emissions. In addition, it is also preferred that the anti-knock agents have a heat of vaporization per unit of combustion energy that is at least three times that of gasoline.

9 Claims, 3 Drawing Sheets



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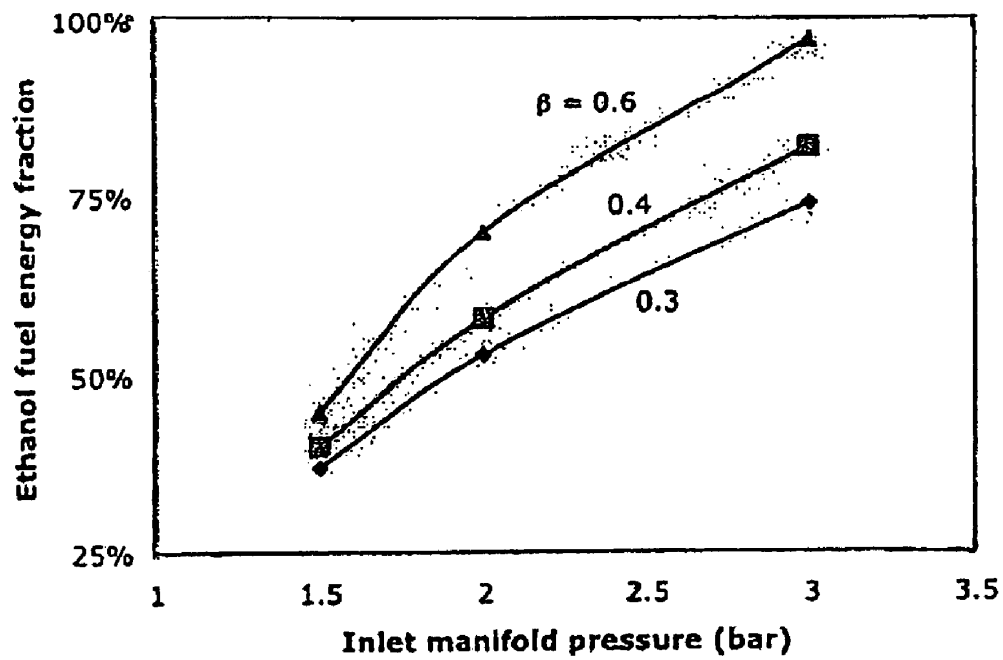
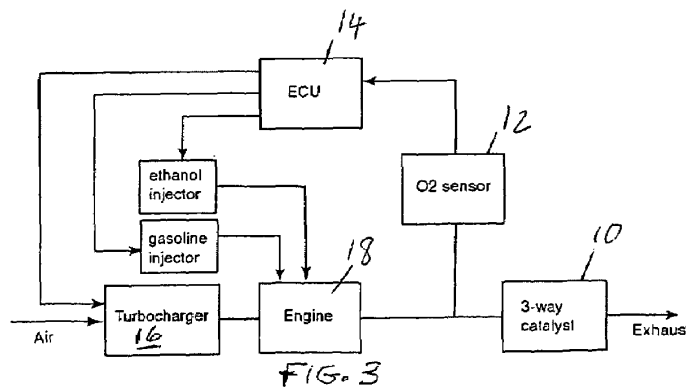
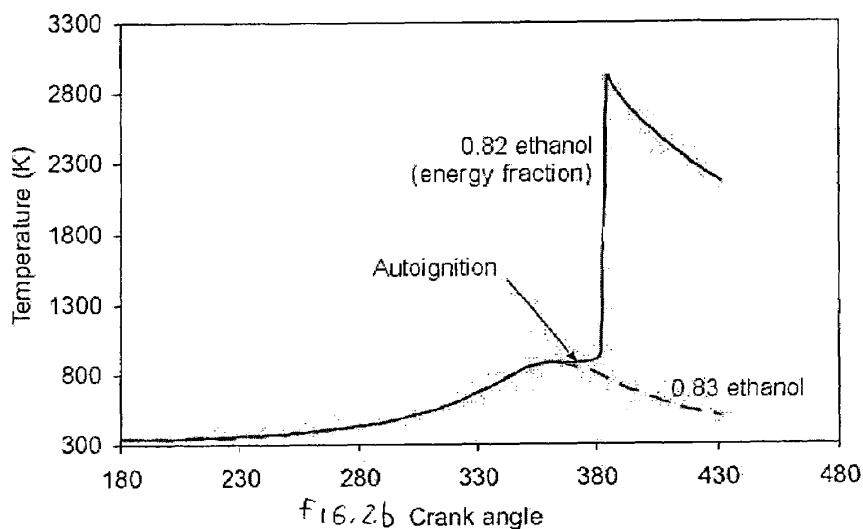
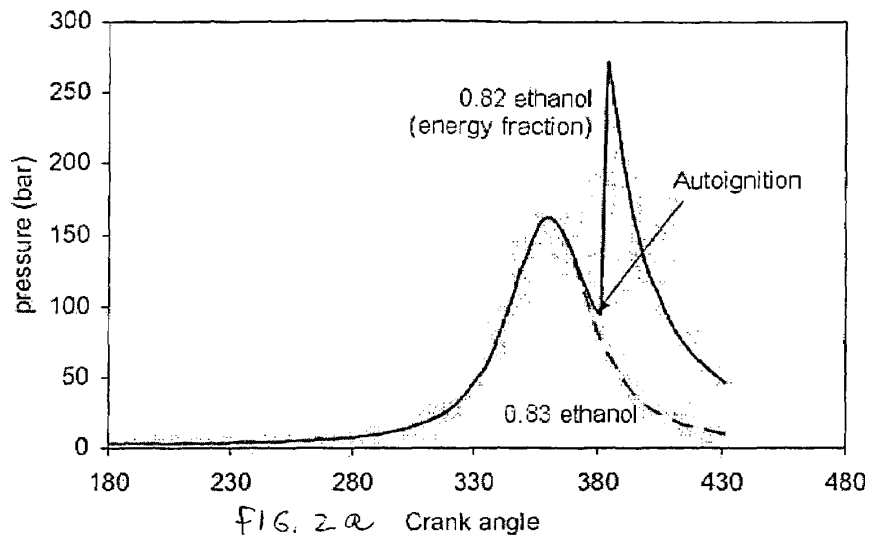


FIG. 1



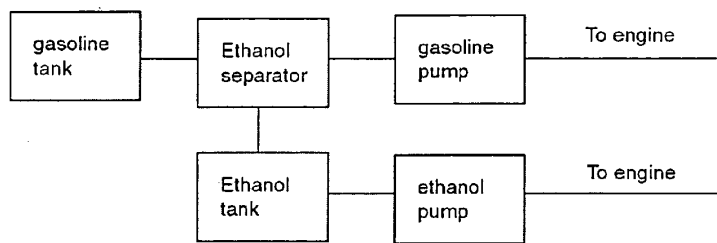
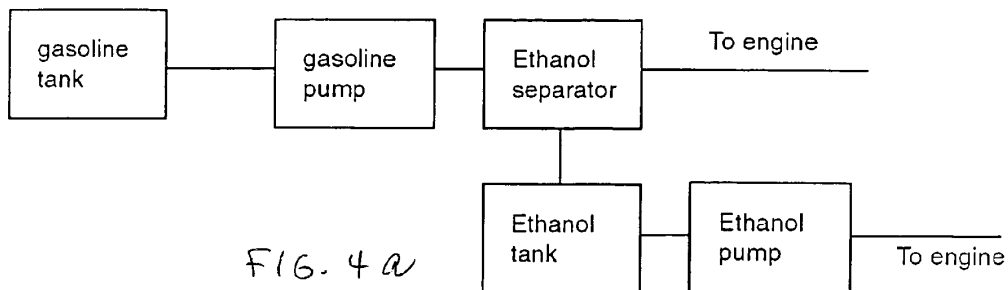


FIG. 4(b)

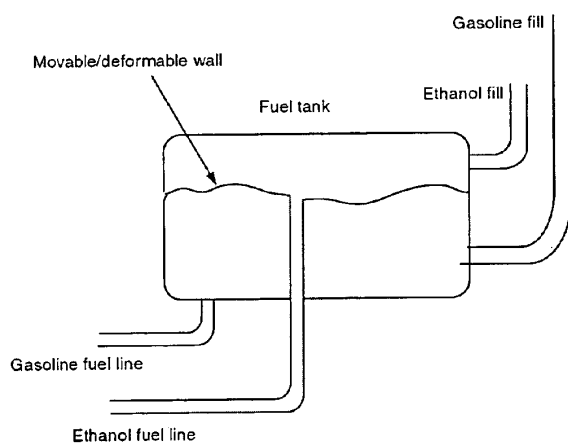


FIG. 5

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