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

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(*) 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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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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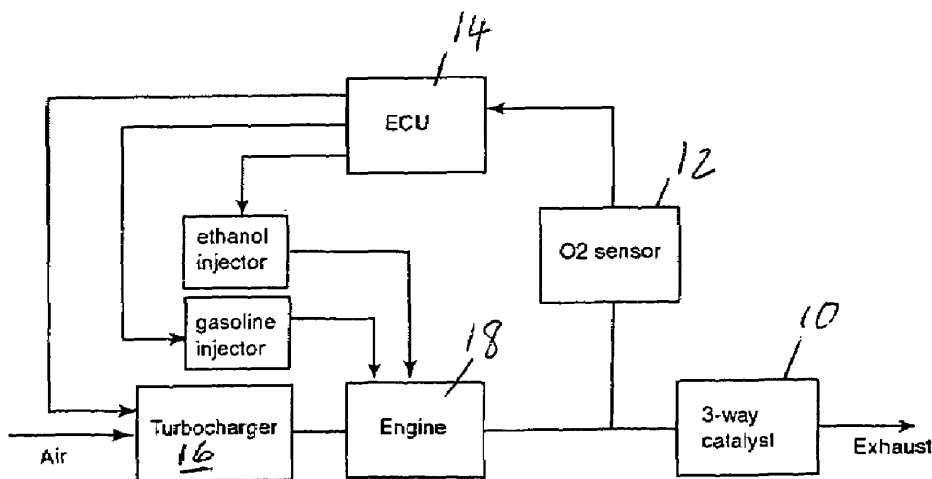
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(57) **ABSTRACT**

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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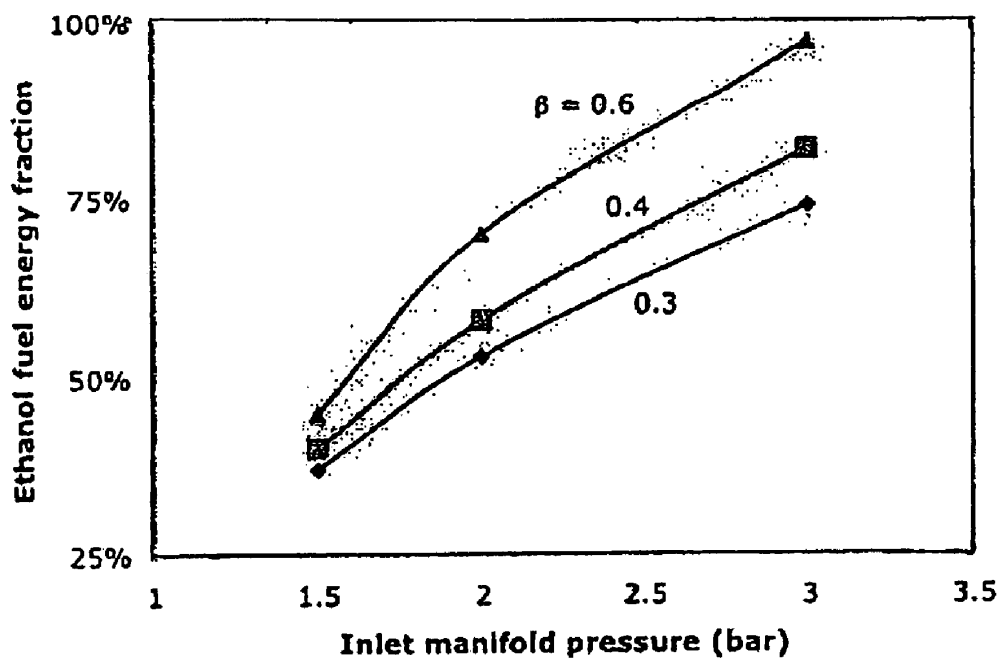
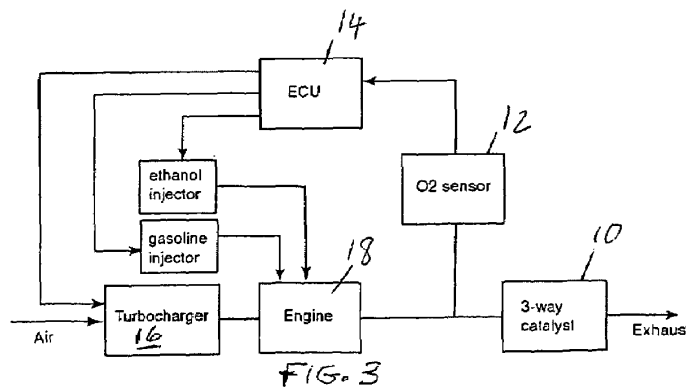
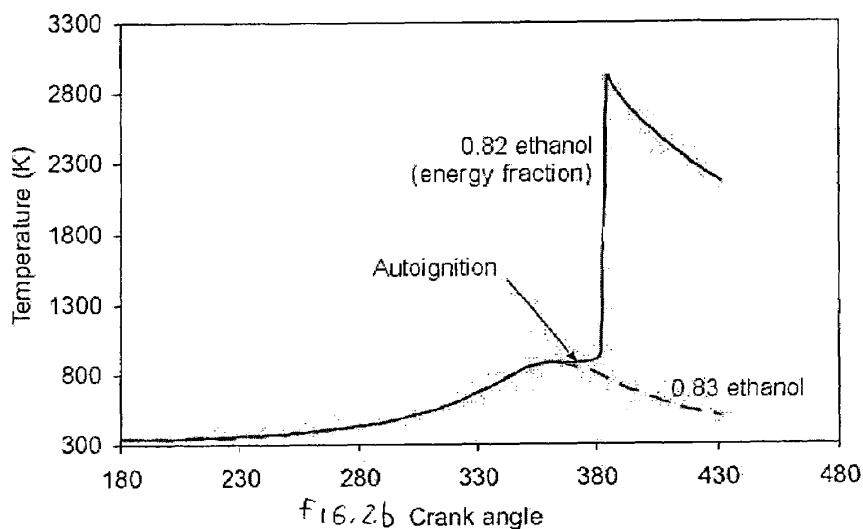
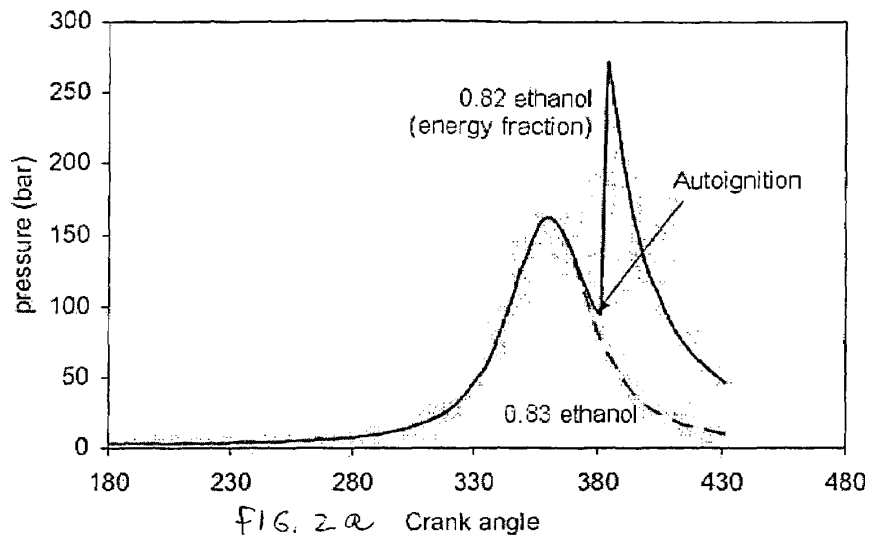
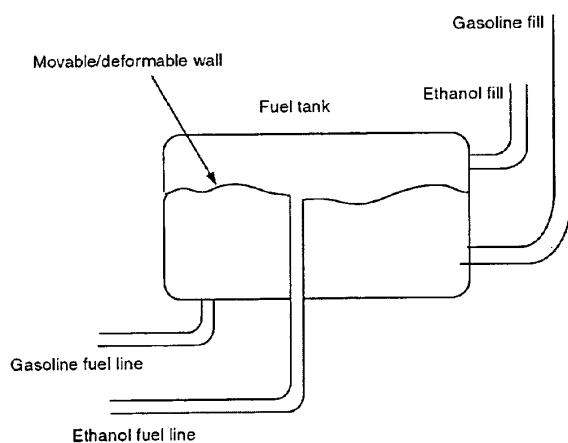
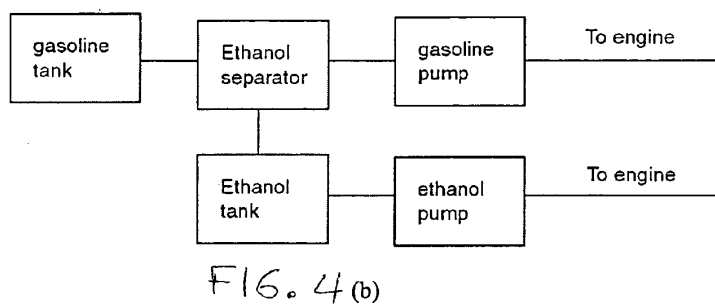
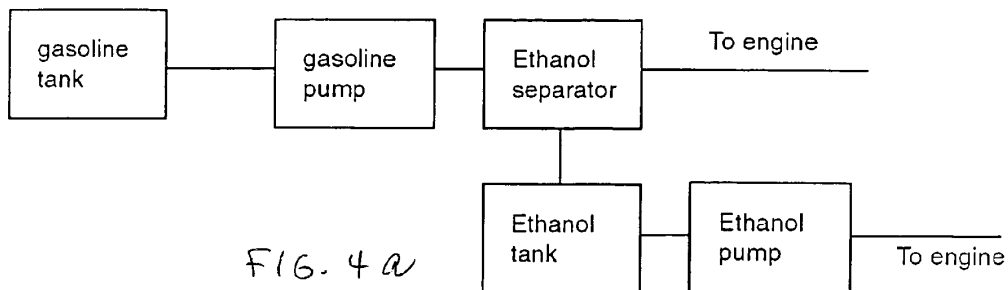


FIG. 1





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