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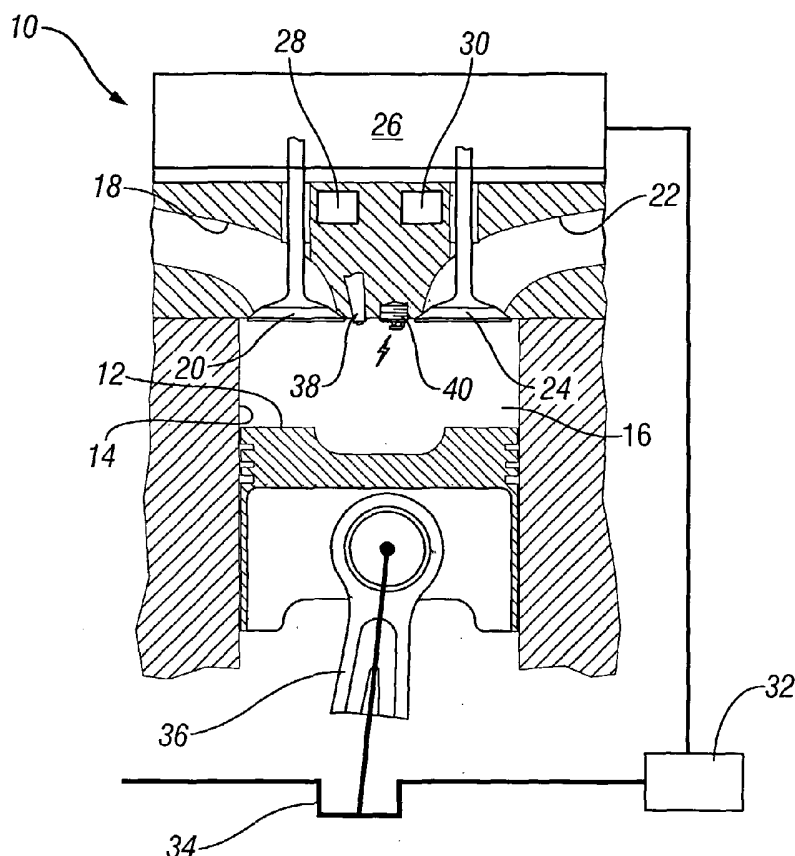
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[Continued on next page]

(54) Title: FOUR STROKE ENGINE AUTO-IGNITION COMBUSTION



(57) Abstract: A method of operating a four-stroke gasoline direct-injection controlled auto-ignition combustion engine includes opening both the intake and exhaust valves during terminal portions of the expansion strokes and initial portions of the contraction strokes, injecting fuel directly into the combustion chamber for mixing with retained gases and igniting the fuel near the ends of the contraction strokes. In the process, combustion gases are expanded to produce power during mayor portions of the expansion strokes, combusted gases are blown down into the exhaust outlet and the air inlet and are partially redrawn into the cylinder with fresh air during the terminal portions of the expansion strokes so the air charges are heated by the hot exhaust gases. Portions of the charges re-expelled and the remaining portions of the charges and injected fuel are compressed for ignition of the dilute fuel/ air and exhaust gas mixture. Substantial reductions of NOx emissions result from the method.



FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,758,174 B1 (FUERHAPTER) 06 JULY 2004 (06.07.2004), SEE ENTIRE DOCUMENT.	1, 3, 4 AND 7
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Y		5 AND 6
Y	US 6,659,071 B2 (LAPOINTE ET AL.) 09 DECEMBER 2003 (09.12.2003), SEE ENTIRE DOCUMENT.	5 AND 6
A	US 4,809,511 A (BAJULAZ) 07 MARCH 1989 (07.03.1989), SEE ENTIRE DOCUMENT.	1-7
A, E	US 6,918,358 B2 (HU) 19 JULY 2005 (19.07.2005), SEE ENTIRE DOCUMENT.	1-7
A	US 6,615,771 B2 (DENGIER ET AL.) 09 SEPTEMBER 2003 (09.09.2003), SEE ENTIRE DOCUMENT.	1-7
A	US 5,010,860 A (BROUSSARD) 30 APRIL 1991 (30.04.1991), SEE ENTIRE DOCUMENT.	1-7
A	US 4,917,054 A (SCHMITZ) 17 APRIL 1990 (17.04.1990), SEE ENTIRE DOCUMENT.	1-7
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