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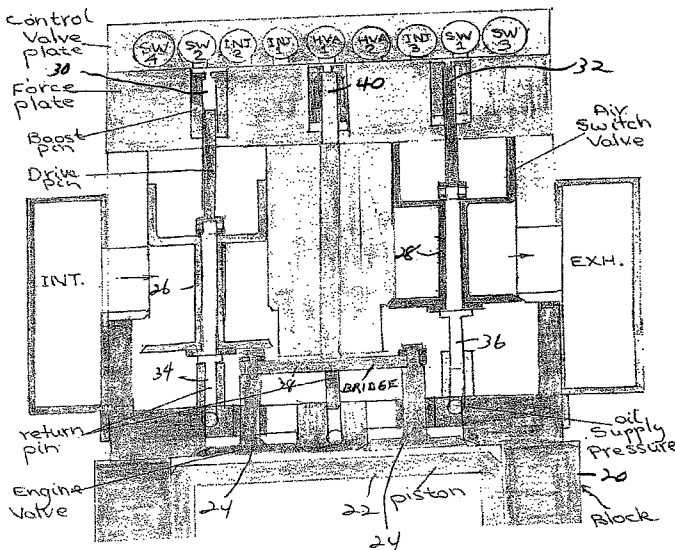
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(54) Title: METHODS AND APPARATUS TO USE ENGINE VALVES AS BOTH INTAKE AND EXHAUST VALVES



(57) Abstract: Methods and apparatus to selectively use engine valves (24) as both intake and exhaust valves and to selectively operate the engine as a 2 cycle or as a 4 cycle engine. In a disclosed embodiment, the intake valves and the exhaust valves are manifolded together through a small manifold, with the manifold being connectable to the intake manifold or the exhaust manifold through two-way valves (26, 28). In preferably a camless engine, the engine valves may be controlled to operate the intake valves as intake valves only or to operate as both intake valves and exhaust valves, and to operate the exhaust valves as exhaust valves only or to operate the exhaust valves as both intake valves and exhaust valves. Exemplary embodiments are disclosed.

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**INTERNATIONAL SEARCH REPORT**

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**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. F01L15/04 F01L1/28 F01L1/44 F01L5/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 F01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	GB 204 183 A (GEORGE RICHARD INSHAW) 27 September 1923 (1923-09-27) the whole document	11,14,18
X	US 2 323 251 A (NOAH SMITH THOMAS) 29 June 1943 (1943-06-29) the whole document	11,14

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See patent family annex.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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