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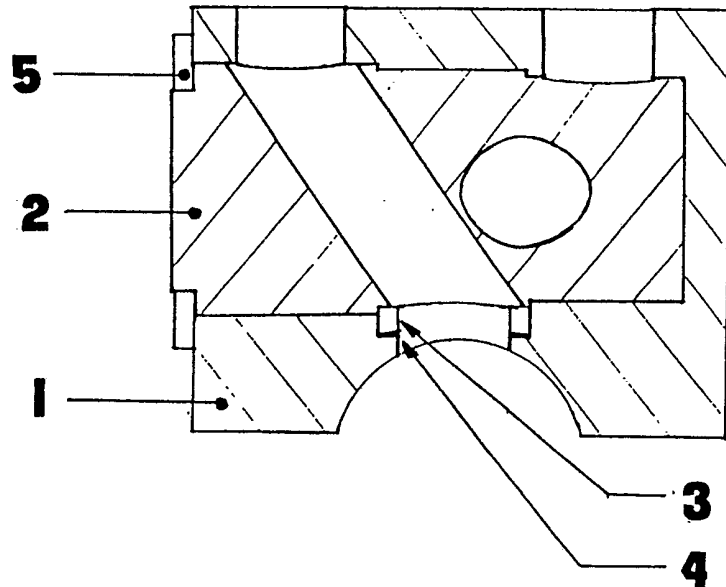
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(72) Inventor Howard Brian Leitch	(58) Field of search F1B Selected US specifications from IPC sub-class F01L
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(54) Rotary spool valve

(57) A spool 2 rotates at half crankshaft speed with inlet and exhaust ports arranged diagonally opposed through its long axis, and at an angle to each other about its circumference. A pressure assisted sprung combustion chamber seal 3 is provided to maintain compression. The timing of the entry and exit of combustion gases is effected by varying the port angles and sizes.

FIG. 1



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FIG. 1.1

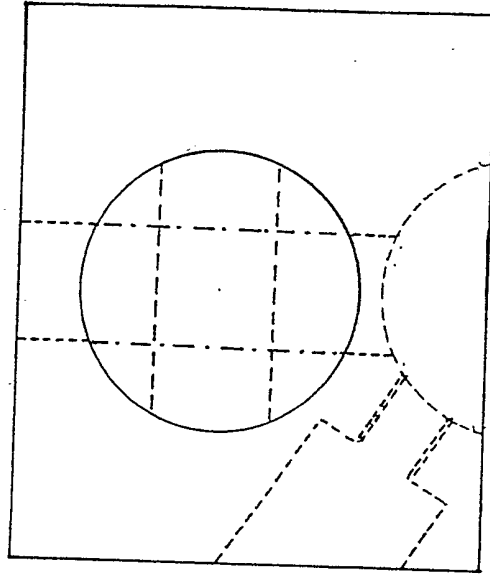


FIG. 1

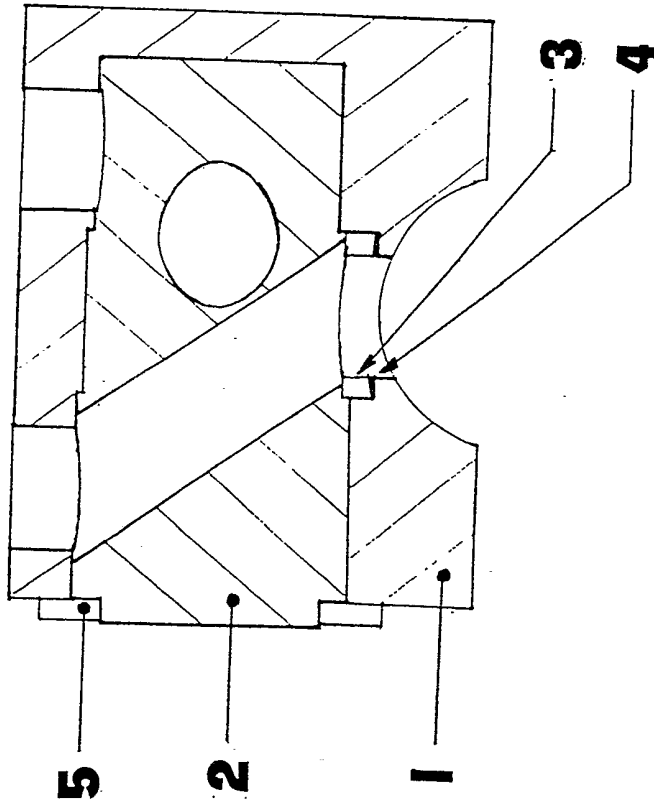


FIG. 2.1

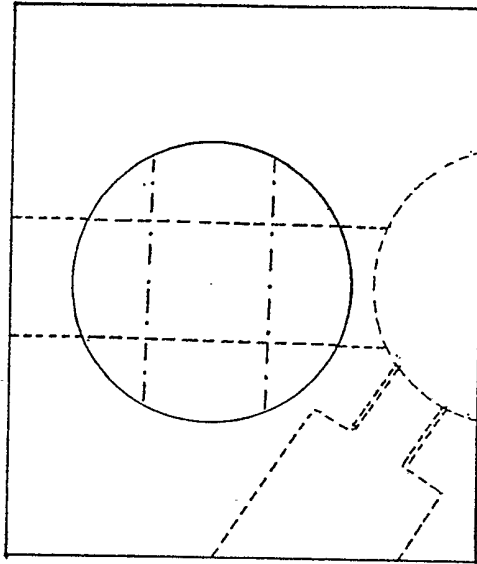


FIG. 2

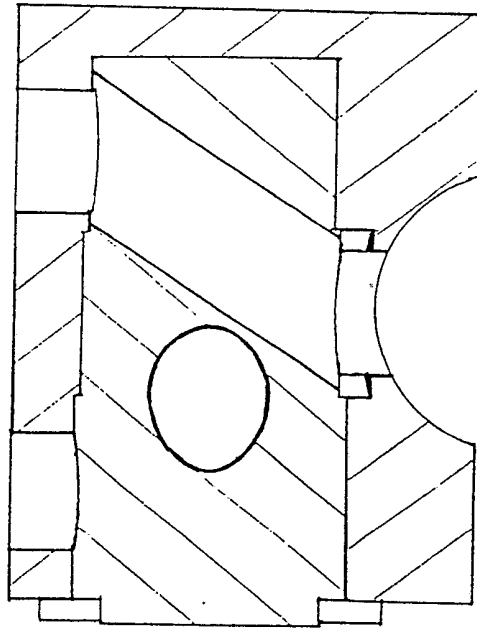
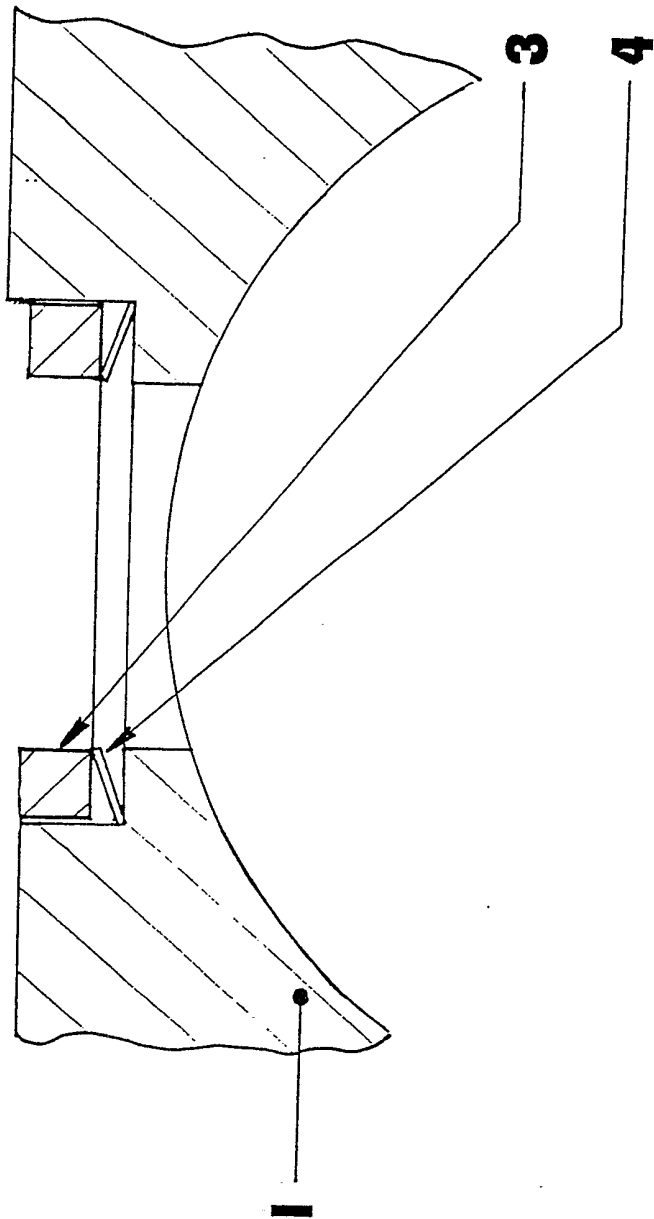


FIG. 3



SPECIFICATION

Rotary spool valve

5 The invention relates to a rotary spool valve cylinder head for internal combustion engines.

The four stroke internal combustion engine is normally provided with a shaft running at half crankshaft speed opening and closing
10 poppet valves to control the entry and exit of combustion gases.

The invention utilises a spool also rotating at half crankshaft speed, but with inlet and exhaust ports arranged diagonally opposed
15 and at an angle to each other through the centre-line, sealed by means of a stepped circumference and sprung combustion chamber seal. This unique through the spool compound angle port orientation means the inlet and ex-
20 haust gases follow straight line paths, consequently, gas velocities are higher than poppet valve or conventional rotary valve cylinder heads.

A specific embodiment of the invention as
25 would be fitted to a single cylinder four stroke engine will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 shows a section through the
30 centre-line of the assembled rotary spool valve cylinder head at the point where the inlet port is fully open.

Figure 1.1 shows the end view and hidden
35 port detail at the above point. The retaining ring is not shown, (for clarity).

Figure 2 shows the assembly as in Fig. 1, but with the exhaust port fully open.

Figure 2.2 shows the end view and hidden
40 port detail at this point.

Figure 3 shows the combustion chamber
45 portseal in detail.

Note Spool drive, cylinder barrel, piston, carburettor/injection equipment, spark plug and
45 other well-established mechanisms are not shown on drawings for reasons of clarity.

Referring to Fig. 1, the assembly comprises
50 of a housing (1), a spool valve (2), combustion chamber seal (3), disc spring (4), and an end plate (5).

The housing (1) fulfils the following func-
55 tions:—

(i) It forms the housing for the spool valve to run in;

(ii) It forms the cylinder head and combus-
60 tion chamber;

(iii) It forms the three fixed ports, (inlet, ex-
haust, and combustion chamber);

(iv) It is the mounting for the spark plug.

60 Into this housing the spool valve (2), combustion chamber seal (3), and disc spring (4), are fitted, the end plate (5) then being used to hold the spool valve in position. The spool valve is then driven by the crankshaft at half
65 engine speed in typical fashion, (normally a

chain and chainwheel assembly is used for this purpose). The spool valve port orientation, (see Fig. 1 & 2), is such that the inlet and exhaust ports are opened and closed al-
70 ternately as with conventional valve arrangements. The time and duration of the openings may be varied to suit a particular engine by altering the port angles and sizes.

The spool also forms a seal between the
75 combustion chamber and the atmosphere during the periods that the ports are closed. To facilitate this, the shaft and housing are stepped and a seal is provided at the combustion chamber fixed port. (Fig. 3 shows the
80 combustion chamber seal in detail). The disc spring is placed in the housing so as to form a tight fit and the combustion chamber seal is placed on top where under spring pressure, it will press against the spool valve to form a
85 seal. The orientation of the disc spring causes it to exert an increased pressure on the combustion chamber seal, and consequently, on the spool valve during periods of high pres-
90 sure in the combustion chamber. This effects an improved seal between the housing and the spool valve. The spring also allows auto-
matically for wear in the combustion chamber seal.

The lubrication, cooling, ignition mechanisms
95 would be as would normally be provided to suit the particular engine application.

CLAIMS

1. A four stroke internal combustion en-
100 gine cylinder head using a spool rotating at half crankshaft speed with inlet and exhaust ports arranged diagonally opposed through its long axis and at an angle to each other about its circumference.

105 2. The rotary spool valve as claimed in (1) with a stepped spool and housing to provide improved gas sealing.

110 3. The rotary spool valve as claimed in (1) or (2) with a pressure assisted spring seal to seal the spool and the housing.