United States Patent [19]

Rossi

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[54] **ENGINE HAVING RECIPROCATING PISTON AND ROTARY PISTON**

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[52] **U.S. Cl.** .. **123/197 R;** 123/197 AB; 123/197 A; 123/197 AC; 92/33

[51] **Int. Cl.**[2] **F02B 75/32**

[58] **Field of Search**... 123/197 A, 197 AB, 197 AC, 123/197 R, 58 C, 90.31; 74/57, 58; 92/33

[56] **References Cited**

UNITED STATES PATENTS

855,256	5/1907	Morey	123/197 R X
1,089,408	3/1914	Ganderton	123/58 C UX
1,537,724	5/1925	Zimmer	123/197 R UX
1,561,826	11/1925	Bremer	74/58 X
1,723,100	8/1929	Voorhies	123/197 R UX
2,262,963	11/1941	Procissi	74/58
3,056,386	10/1962	Aarvold et al.	92/33
3,255,806	6/1966	Meyer et al.	92/33 X
3,388,603	6/1968	Clark	74/57
3,393,610	7/1968	Aarvold	92/33

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[57] **ABSTRACT**

An engine having a reciprocating piston and rotary piston rod wherein, the piston rod is provided with a spiral groove for receiving a detent carried by the piston, a spline connection being provided between the piston and the cylinder wall to prevent rotation of the piston.

5 Claims, 7 Drawing Figures

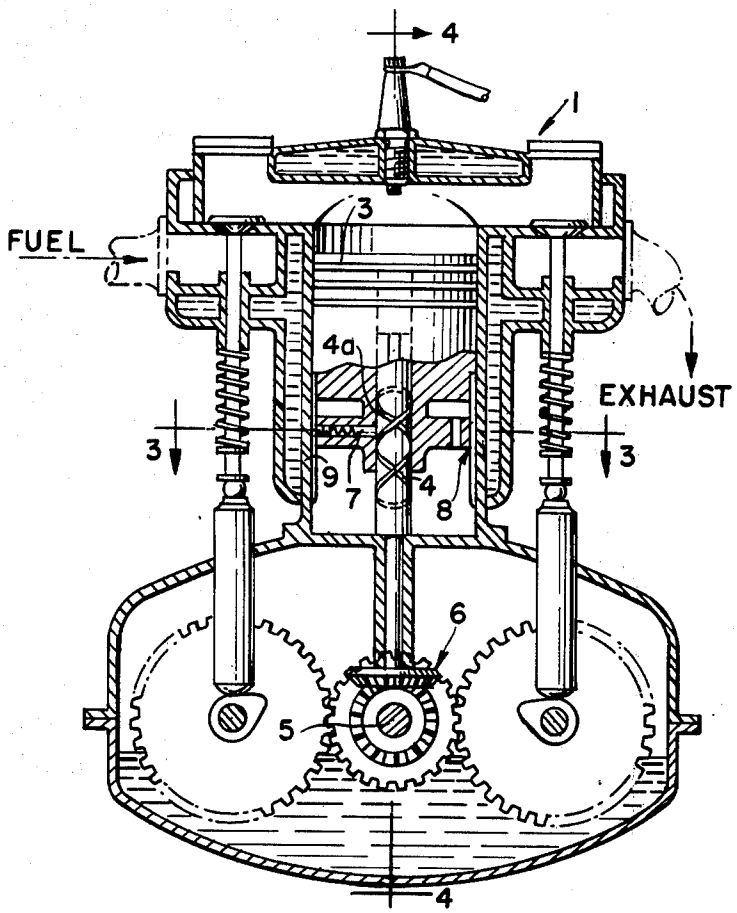


FIG. 1.

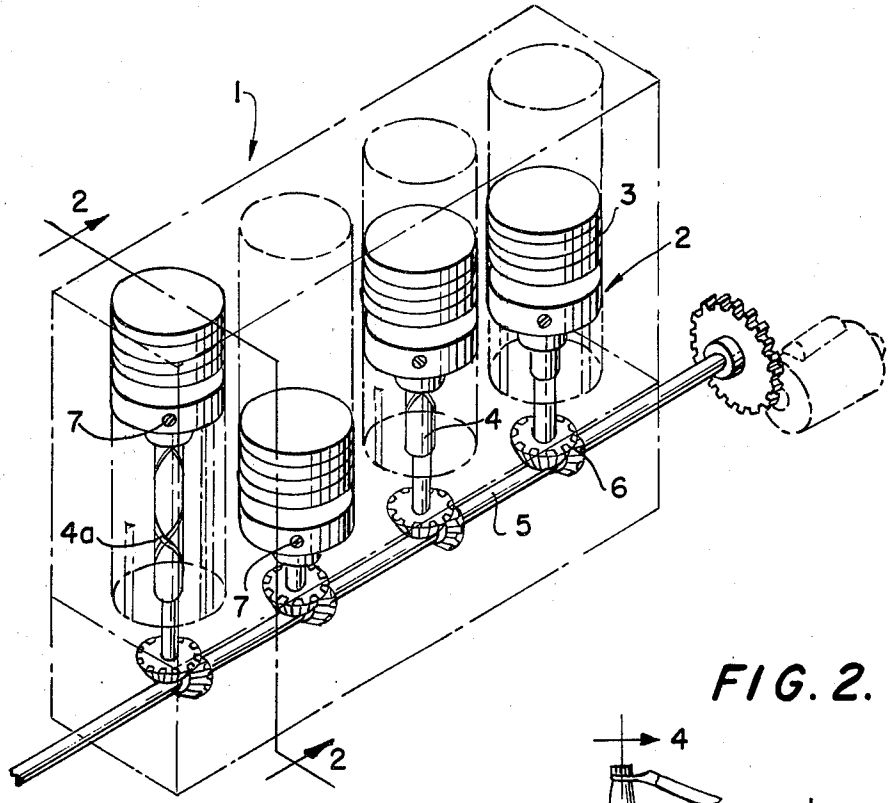


FIG. 2.

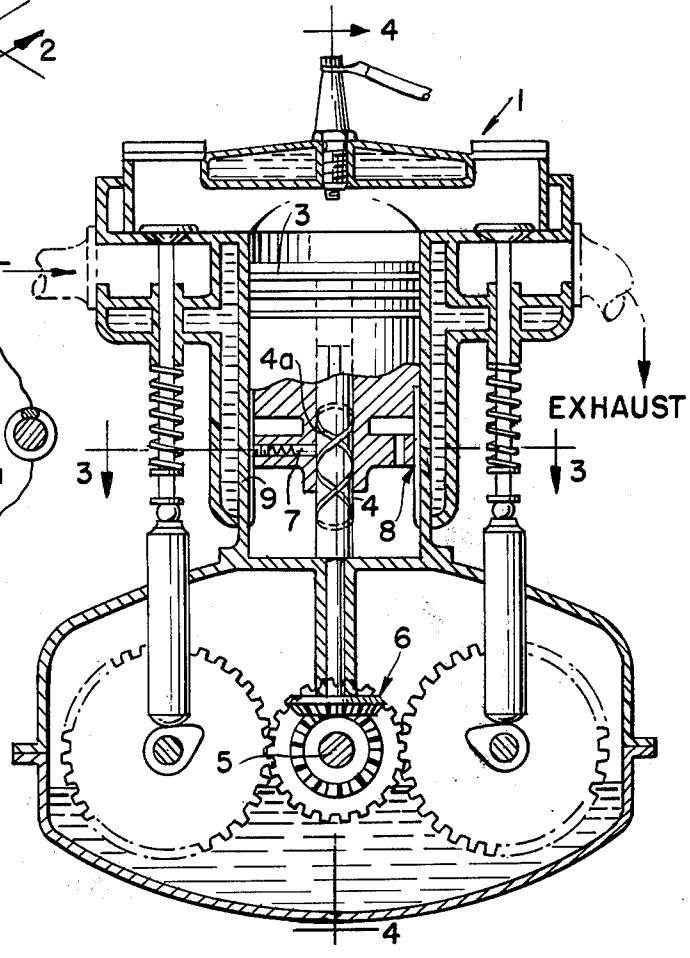


FIG. 3.

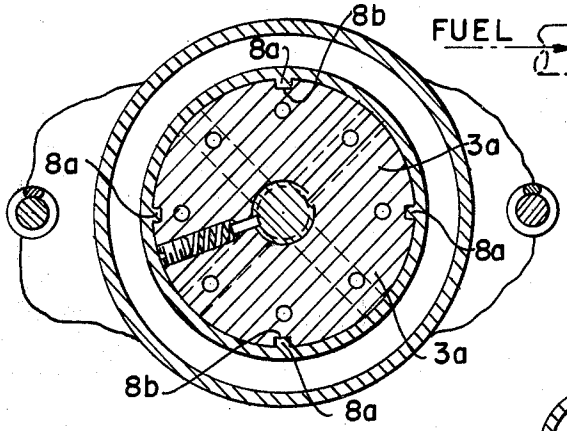


FIG. 4.

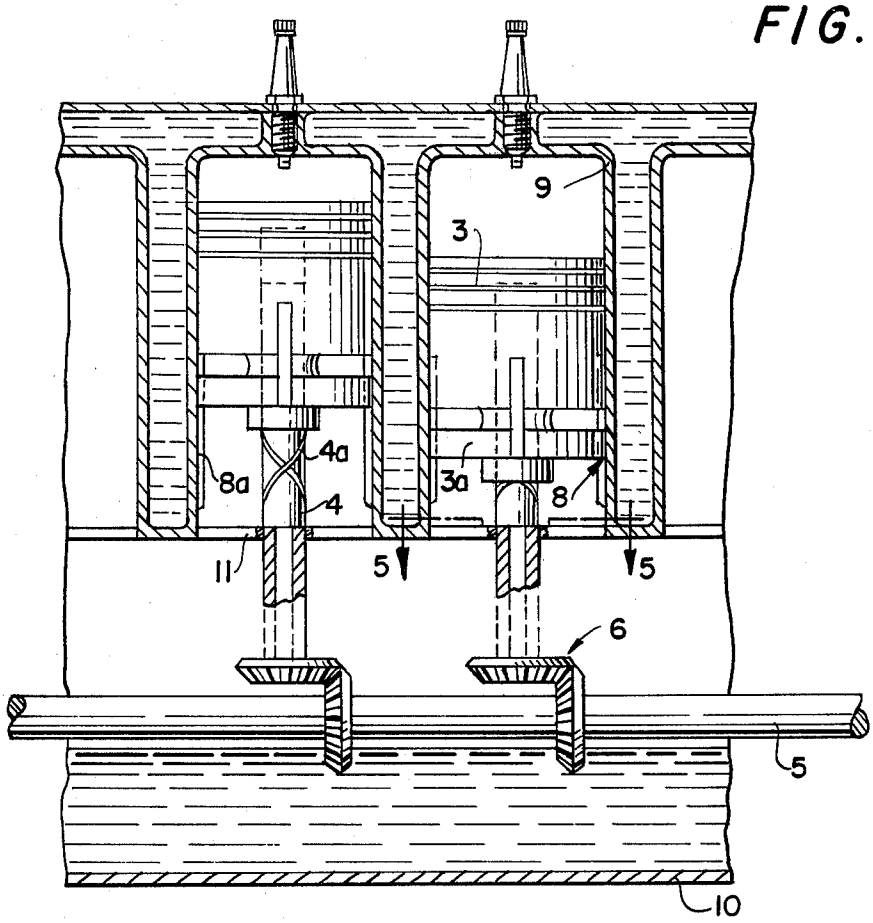


FIG. 6.

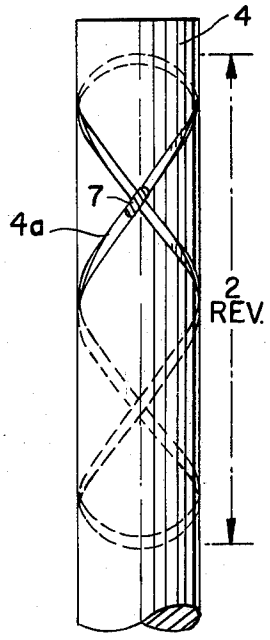


FIG. 5.

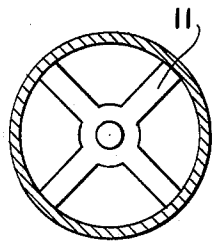
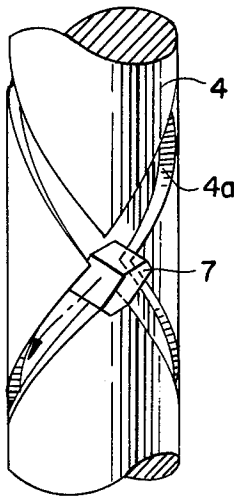


FIG. 7.



ENGINE HAVING RECIPROCATING PISTON AND ROTARY PISTON

BACKGROUND OF THE INVENTION

Various engines have been proposed wherein the piston is slidably mounted on the piston rod so that reciprocation of the piston on the piston rod imparts a rotary motion to the piston rod which is geared to the engine drive shaft. The piston is usually keyed to the piston rod in such a manner that a key or detent carried by the piston is received in a spiral groove formed on the piston rod. To prevent rotation of the piston relative to the piston rod, various types of guides have been proposed which usually extended through the piston. While this arrangement prevented rotation of the piston relative to the piston rod, the gas-tight integrity of the cylinder, on the combustion chamber side of the piston, was broken with the resultant loss of compression in the engine.

To overcome the above-noted disadvantage, the piston and rotary piston rod assembly of the present invention has been devised wherein a secondary piston is secured to the lower surface of the main piston and a spline connection is provided between the secondary piston and the cylinder wall. By this construction and arrangement, the piston is prevented from rotating during its reciprocatory movement relative to the piston rod while the gas-tight integrity of the cylinder is maintained.

BRIEF DESCRIPTION OF THE DRAWING:

FIG. 1 is a perspective view of a four cylinder engine employing the piston and rotary shaft assembly of the present invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a view taken along line 3—3 of FIG. 2;

FIG. 4 is a view taken along line 4—4 of FIG. 2;

FIG. 5 is a view taken along line 5—5 of FIG. 4;

FIG. 6 is a side elevational view of a portion of the piston rod; and

FIG. 7 is an enlarged, fragmentary perspective view of the piston rod.

Referring to the drawings, and more particularly to FIGS. 1 and 2 thereof, a four-cylinder, internal combustion engine 1 is shown employing a piston and rod assembly 2 of the type wherein the piston 3 reciprocates relative to the piston rod 4 to impart a rotary motion thereto which, in turn, drives a drive shaft 5 via gear assembly 6. Rotary motion is imparted to the piston rod by a spring biased detent 7 carried by the piston and engaging a spiral groove 4*a* formed in the piston rod. While only one spring biased detent is shown, a plurality of radially extending detents could be employed.

In order to prevent rotation of the piston during its reciprocatory movement on the piston rod, a spline connection 8 is provided between the piston 3 and cylinder wall 9. As will be seen more clearly in FIGS. 3 and 4, the spline connection comprises a plurality of circumferentially spaced, longitudinally extending keys 8*a* secured to the cylinder wall and slidably received in similarly disposed keyways 8*b* formed in a secondary piston 3*a* mounted on the lower surface of the main piston 3. The lower portion of the main piston is also provided with keyways which engage the keys as the piston reaches the bottom dead center position of its stroke.

From the construction and arrangement of the spline connection 8 between the piston and the cylinder, the rotation of the piston relative to the piston rod is prevented while the gas-tight integrity of the cylinder on the combustion chamber side of the piston is not compromised.

While, for purposes of illustration, the piston and rod assembly together with the associated spline connection, have been shown employed in an internal combustion engine, it will be appreciated by those skilled in the art that the particular piston, rod and spline connection could be employed in other types of motors or engines such as hydraulic, pneumatic or steam wherein the drive is obtained by the piston reciprocating on the rotating piston rod.

It has been found that in rotary piston rod-type internal combustion engines vibrations, which are found in conventional internal combustion engines employing crank shafts, are eliminated together with the necessity for large crank cases. As will be seen in FIG. 4, the oil for the gears 6 is contained in a shallow pan 10 disposed beneath the cylinders and oil for the pistons is splashed into each cylinder through a spider 11 mounted on the end of the cylinder through which the rotary piston rod 4 extends.

One stroke of the piston 3 is designed to turn the drive shaft from one revolution to any desired number of revolutions depending upon the pitch of the spiral groove formed on the piston rod and the type of transmission gears.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. In an internal combustion engine of tye type employing reciprocating piston means slidably mounted on the head-end of a piston rod for imparting rotary movement to the piston rod, the improvement comprising, radially extending guide means extending between the piston means and the cylinder for preventing rotation of the piston during its reciprocatory movement on the piston rod, said guide means comprising at least one longitudinally extending key secured to the cylinder wall in proximity to only the bottom end thereof, and a keyway formed on the side wall of said piston means in proximity to only the bottom end thereof for receiving said key to thereby provide a spline connection between the piston means and the cylinder in proximity to only the bottom ends thereof, whereby rotation of the piston relative to the piston rod is prevented while the gas-tight integrity of the cylinder on the combustion side of the piston is maintained.

2. In an engine according to claim 1 wherein the piston means comprises a main piston and a smaller secondary piston secured to the lower face of the main piston, said spline connection extending between the secondary piston and the cylinder.

3. In an engine according to claim 2 wherein rotary motion is imparted to the piston rod by detent means carried by the piston means engaging a spiral groove formed on the piston rod, said detent means being carried by said secondary piston.

4. In an engine according to claim 3 wherein the detent means comprises at least one radially extending, spring biased pin.

5. In an engine according to claim 2, wherein a keyway is provided in the lower portion of the main piston which engages the key as the piston reaches the bottom dead center position of its stroke.

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