Aug. 27, 1935. F. G. GODSELL 2,012,874

PISTON FOR INTERNAL COMBUSTION ENGINES

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FIG. 1.

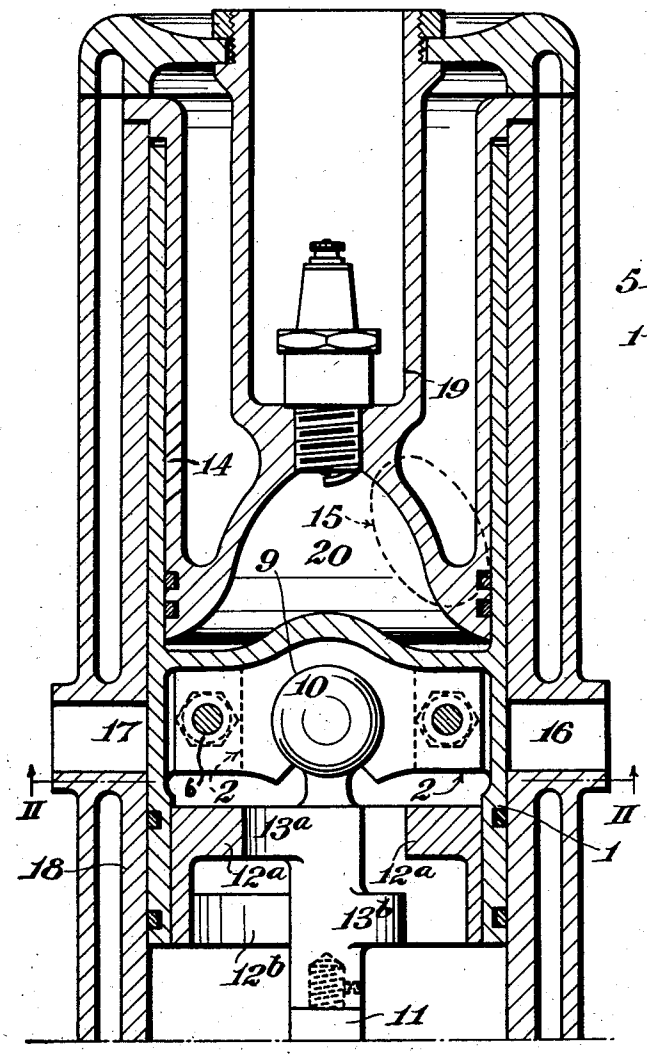


FIG. 2.

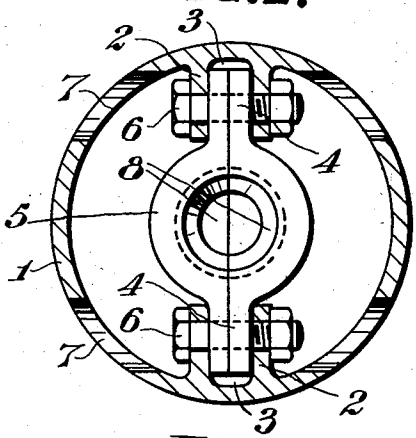
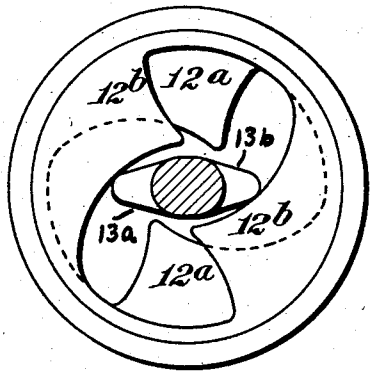


FIG. 3.



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PISTON FOR INTERNAL COMBUSTION ENGINES

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3 Claims. (Cl. 123—45)

This invention relates to pistons for internal combustion engines and the like and has for its object to provide a piston of trunk form as customarily used in a certain type of internal combustion engine which piston incorporates means for controlling the ingress and egress of gas to the engine cylinder thereby eliminating the use of separate valve control means of conventional form for this purpose.

Broadly, the invention consist in the provision of a piston which is rotatably mounted on its piston rod, the side-to-side swing or oscillation of the piston rod being utilized to effect rotation of the piston relative to the rod so that ports, or the equivalent, formed in or on the said piston function, owing to the combined rotary and reciprocatory movements of the piston, to control the ingress and egress of gas to and from the cylinder.

To permit of relative rotary movement between the piston and its rod a ball-and-socket or universal joint assembly of particular construction is used. Incidentally this joint assembly, which permits relative rotary movement between the piston and rod, is applicable for use generally in internal combustion engines apart from the specific use hereinafter described, as the joint eliminates the side thrust on the piston caused by the throw of the crank shaft, thereby greatly reducing the "oval" wear of the cylinder and piston.

The invention is illustrated by the accompanying drawing, wherein:—

Figure 1 is a vertical cross section view through an engine showing the piston in use;

Figure 2 is an inverted sectional plan view of the piston on line 11—11 of Figure 1; and

Figure 3 is an inverted plan view of the piston.

In the embodiment illustrated, the piston 1 is provided, in lieu of the customary gudgeon pin bosses, with a pair of oppositely disposed inwardly projecting bosses or webs 2 each having therein a flat-sided slot or recess 3. Within these recesses 3 the two opposite outer extremities 4 of a socket member 5 are adapted to be received, said extremities 4 being secured within the boss recesses 3 by transverse pins or bolts 6 which are inserted through openings 7 in the skirt of the piston 1 adjacent said bosses 2. The socket member 5 is constituted by two plates having cupped centers which together form a spherical housing 9 within which is accommodated the ball-shaped upper end 10 of the connecting rod 11. These two plates are placed together to enclose the rod ball-end 10 within the spherical housing 9 and the socket member 5, formed by the assembled plates, is then secured by its extremities 4 within the boss recesses 3 of the piston body 1.

For the purpose of imparting a rotary movement to the universally mounted piston, the skirt of the piston 1 is provided at its lower end, with four cam members 12a, 12b arranged in upper and lower pairs, the cam of each pair being oppositely disposed and the upper pair disposed at right angles to the lower pair. Each cam member consists of an inwardly projecting web having a sloping inner face. The piston rod 11 is provided with two projections 13a, 13b, oppositely disposed and having inclined faces, which are adapted during the oscillations of the rod 11 to contact with the cam members on the piston. The contours of the piston cam members 12a, 12b, and rod projections 13a and 13b are such that the rod projections alternately contact with the cam faces, so that a partial rotational movement (equal to one eighth of a complete revolution) is imparted to the piston 1 by the rod 11. The cam faces are operated on in succession, that is, as the rod 11 oscillates outwards from the centre of the piston 1, one rod projection 13a co-operates with one of the two upper cam faces 12a to move the piston through one-eighth of a revolution, then as the rod swings towards the other side the other rod projection 13b co-operates with the one of the lower cam faces 12b to move the piston through the same distance; next the first rod projection 13a co-operates with the other upper cam 12a, and finally the second rod projection 13b co-operates with the other upper cam 12b, the resultant effect being the imparting to the piston 1 of a movement equal to one half of a complete revolution. Hence the piston performs one complete revolution at every two revolutions of the crankshaft. The cam faces are, of course, arranged so that the piston is left in such a position, after each cam-effected movement thereof by one of the projections of the rod, to enable the second projection to readily take up the further movement of the piston, that is, each cam face commences in alignment with the finish of the cam face which precedes it in order of working.

The skirt of the piston 1 is extended above the crown thereof in the form of sleeve 14 and is provided with ports 15 (only one of which is seen) which register at the requisite periods with the inlet and outlet ports 16, 17 respectively in the cylinder wall 18. The crown of the piston 1 may be cupped inwardly instead of outwardly, as shown, and the skirt extension may be provided with a wide compression ring. The cylinder head

19 is of re-entrant form with a substantially conical shaped combustion space 20.

I claim:—

1. In an internal combustion engine, a cylinder, a piston reciprocal and rotatable therein, the cylinder having ports controlled by said movements of said piston, a connecting rod with which the piston is connected for rotary movement, about its own axis, said rod being rockable relative to said piston, and cam means solely between the piston and the connecting rod operable by rocking movements of the connecting rod to impart rotation to the piston substantially continuously in a single direction during continuous reciprocation of the piston.

2. In an internal combustion engine, a cylinder, a piston reciprocal and rotatable therein, the cylinder having ports controlled by said movements of said piston, a connecting rod with which the piston is connected for rotary movement about its own axis, said rod being rockable relative to said piston, and a cooperating pair of cam means between the piston and the connecting rod and spaced apart longitudinally of the piston operable by rocking movements of the connecting rod to impart rotation to the piston substantially continuously in a single direction during continuous reciprocation of the piston.

3. In an internal combustion engine, a cylinder, a piston reciprocal and rotatable therein, the cylinder having ports controlled by said movements of said piston, a connecting rod with which the piston is connected for rotary movement about its own axis, said rod being rockable relative to said piston, a pair of projections on the connecting rod longitudinally spaced relative to said rod, and two pairs of cams on the piston longitudinally spaced relative thereto for cooperation with said projections, said projections being disposed at opposite sides of said rod, the cams of each pair being diametrically oppositely disposed, and the cams of the respective pairs having a right angular displacement, whereby the piston is rotated substantially continuously in a single direction by rocking of the connecting rod during continuous reciprocation of the piston.

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