

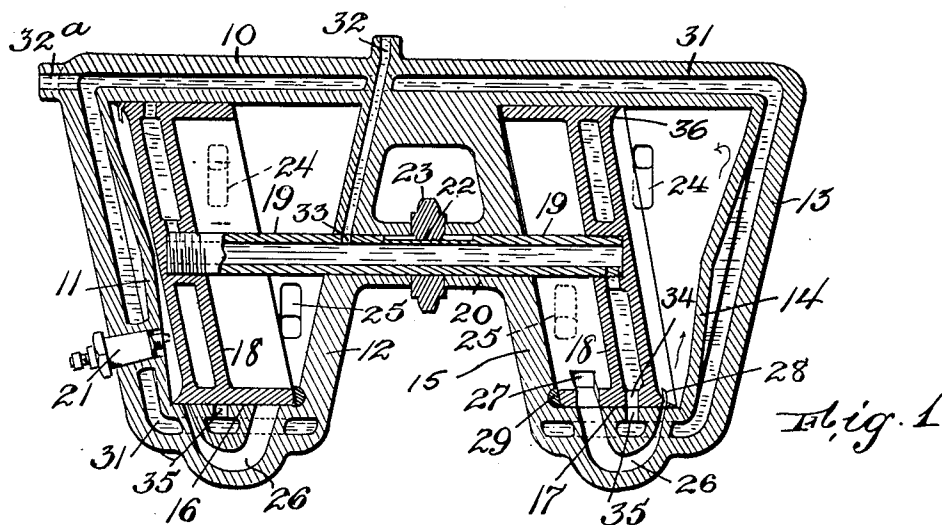
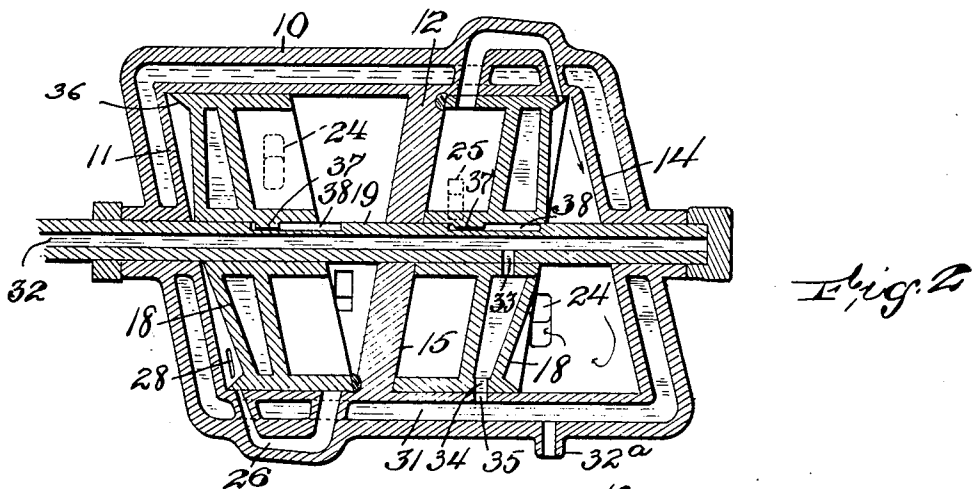
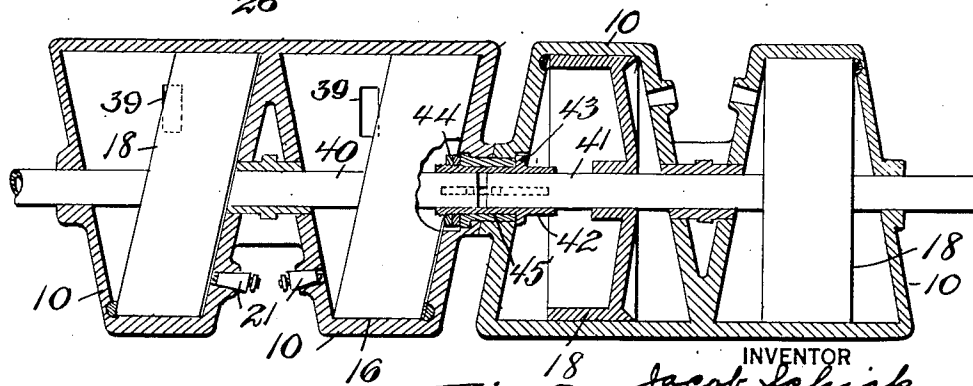
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J. SCHICK

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ENGINE

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UNITED STATES PATENT OFFICE

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ENGINE

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This invention relates to an improved engine, which may be applied to the class of internal combustion engines and also steam engines or outside the class of prime movers it is adapted for the construction of pumps.

An object of the invention is to provide an engine in which the number of parts is reduced to the minimum thereby decreasing the chances of accidental stalling of the engine. This makes it a highly desirable engine for aircraft.

Another object of the invention is to provide a cooling system of simple construction which insures an even proper temperature for the parts of the engine.

Another object of the invention is to utilize the piston, which is in the form of a wobble-plate, for keeping the inside of the cylinder clear of carbon and to eliminate uneven wear on the cylinder walls.

The invention is illustrated in the accompanying drawings in which Figure 1 is a section of an engine embodying my invention. Figure 2 is a section of a modified form and Figure 3 is a section of another modified form.

The invention is designed to employ the required number of units to develop the required power, each unit comprising a cylinder and a wobble-plate is confined in the cylinder so that its periphery passes through a fixed channel at one point in the cylinder. This causes the wobble-plate to move longitudinally except at this point and either moves on its shaft or the shaft is mounted to move longitudinally to the desired extent.

In the construction of the engine the usual form of cylinder is one with inclined ends that are at opposed angles and are thus in planes that converge.

The wobble-plate is of a depth to fit in the narrow part of the cylinder and when rotated passes through this narrow part, the portion of the wobble-plate not in this part being free to travel a limited longitudinal path determined by the pitch or angle of the wobble-plate.

In Figure 1 I show the cylinder 10 which has the inclined ends 11 and 12, these ends being in planes that converge and I show a

second cylinder 13 which has similar ends 14 and 15. The construction provides narrow portions 16 and 17 of the respective cylinders.

The cylinders are each provided with a wobble plate 18 which is proportioned to fit approximately in the narrow portions of their respective cylinders. As the wobble plates rotate they pass through these narrow portions and also move longitudinally in the cylinders. The shaft 19 is secured to the cylinders and moves with them. It slides in the bearings 20. In this particular construction the outer ends of the cylinders are the chambers which act as the propelling or explosion chambers according to whether it is a steam or internal combustion engine. I show a spark plug 21 to indicate such explosion end of a cylinder.

The shaft causes the cylinders to move in unison and it is shown as keyed at 22 to the sprocket or gear 23 which is coupled to the mechanism to be driven.

In each cylinder I show an exhaust port 24, an inlet port 25 and a by-pass 26, all these disposed to be opened and closed by the wobble-plate in each cylinder.

The engine shown in Figure 1 is in position for explosion of a mixture in the end 11 of the left hand unit or cylinder. This will force the wobble plate to the other end of the cylinder and rotate it a one-half turn, this compresses the mixture on the other side of the wobble-plate and it is propelled through the by-pass 26 as the openings 27 and 28 come in register with the two ends of the by-pass. The opening 28 is a slit and the by-pass is formed to become broad and flat at its outlet end thus adding velocity to the charge which rushes up the inclined wall or end of the cylinder and scavenges the cylinder and forces the exhaust gases out of the opening 24 which in the meantime has been opened or uncovered by the wobble-plate. While this is going on the other wobble-plate in the right hand unit has been forced over and around to compress its charge and this in turn is exploded. These cylinders therefore work, each as a two-cycle unit and the co-operation makes for a continuous smooth motion of the shaft 19.

The wobble-plate is kept from excess wear on the end of the cylinder by the thrust ball 29 which rocks and adapts itself to the various angular changes of the rim or edge of the wobble-plate in its rotation.

The engine is cooled by fluid in the cooling channel 31 which surrounds the cylinder and the shaft is hollow and supplied by a passage 32 when the hole 33 comes in line with it. The holes 34 come in line or register with the holes 35 at the same time and allow oil to pass out by centrifugal force into the chamber 31. This forces an intermittent flow of fluid which is preferably oil and the oil passes out at 32^a and is then again brought back to 32 by any form of return means. This oil is wiped along the inside wall of the cylinder by the wobble plate, as the hole 34 passes along in a helical path and this keeps the inside wall of the cylinder properly lubricated. The deposits of carbon on the inside wall of the cylinder are removed, as they form, by the edges of the wobble-plate.

These edges are more efficient when they are bevelled or pointed as at 36.

In the form of engine shown in Figure 2 the shaft 19 is secured against longitudinal movement and the wobble plates are arranged to rotate the shaft but they slide on it and the feather 37 slides in the key-way 38 in the shaft. In this construction the two cylinders are arranged with the narrow part of one adjacent the wide part of the other to make a more compact structure.

In Figure 3, I show four units and each one acts to co-operate with the others to form a four-cycle engine. Each one rotates effectively as a driving unit for 120 degrees of rotation so that they overlap in propulsion, thus making a smooth running mechanism. In this figure the left-hand unit is in the position just prior to explosion and thus at the beginning of its power stroke. The second cylinder has just finished its power stroke and opened the exhaust port 39. The third cylinder is in its compression stroke and the fourth cylinder is in its suction or intake position.

The shafts 40 and 41 are each slidable in the sleeve 42 which is held against any movement longitudinally by the flange 43 and the nuts 44 but rotates in the bearing 45.

An engine provided with a wobble-plate rotating and also sliding in a cylinder eliminates uneven forces or side motions and therefore excess wear on the shaft and the cylinder walls. The absence of valves and pushrods, cam-shafts and other extra parts eliminates the chances of these parts becoming disarranged or ineffective and in this respect this engine is particularly adapted for air-craft purposes.

I claim:—

1. An engine comprising a cylinder, a wobble plate rotatable in the cylinder and ca-

pable of longitudinal movement, the cylinder having ports to be successively opened and closed by the said rotatable and longitudinally movable wobble-plate whereby fluid can be compressed between the end of the cylinder and the wobble-plate.

2. An engine comprising a cylinder having a short side, a wobble plate fitting in the cylinder, the cylinder having inclined ends, and a stop at the short side of the cylinder against which the plate is adapted to bear in its rotation, the cylinder having ports for admission and exhaust of fluids and disposed so as to be opened and closed in proper sequence by the plate in its movement and thereby control the admission and release of fluid in the cylinder.

3. An engine comprising a cylinder, a wobble plate rotatable in the cylinder and movable longitudinally therein during its rotation, a shaft connected rotatably with the wobble plate and extending into the ends of the cylinder, a by-pass to conduct fluid from one side of the wobble plate to the other and disposed so as to be opened and closed by the plate in its movement, the cylinder having an exhaust port disposed so as to be opened and closed by the wobble plate, the cylinder having an inlet port disposed so as to be opened and closed by the wobble plate whereby fluid can be admitted into and forced from the cylinder.

4. An engine comprising a cylinder, a hollow wobble-plate in the cylinder, a hollow shaft on which the wobble-plate is mounted, the cylinder having a cooling chamber therein, the cylinder and the shaft having openings therein and ports in the wobble-plate disposed to open the cylinder and shaft openings whereby cooling medium is thrown off by centrifugal action from the wobble-plate into the cooling chamber and drawn into the wobble-plate from the shaft.

5. An engine comprising a cylinder with converging inclined ends, a wobble-plate rotatable in the cylinder and fitting the narrow part of the cylinder, the wobble plate having a recessed rear portion to form a chamber, the peripheral wall of the wobble plate having ports, the cylinder having a by-pass communicating at both ends with the cylinder, the cylinder also having inlet and exhaust ports, the inlet and exhaust ports of the cylinder being disposed to cause the ends of wobble plate to cover and uncover them in proper sequence, the rotation of wobble plate also bringing the ports of the wobble plate in register with the ends of the by-pass whereby fluid can be admitted into and forced from the cylinder.

6. An engine comprising a cylinder with converging inclined ends, a wobble plate rotatable in the cylinder and fitting the narrow part of the cylinder, the wobble plate having a recessed rear portion to form a chamber,

the peripheral wall of the wobble plate having ports, the cylinder having a by-pass communicating at both ends with the cylinder, the cylinder also having inlet and exhaust ports, the inlet and exhaust ports of the cylinder being disposed to cause the ends of wobble plate to cover and uncover them in proper sequence, the rotation of wobble plate also bringing the ports of the wobble plate in register with the ends of the by-pass, one end of the by-pass having a restricted opening and located to project fluid under pressure along an inclined wall of the cylinder whereby fluid can be admitted into and forced from the cylinder.

In testimony whereof I affix my signature.
JACOB SCHICK.

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