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RECIPROCATING CYLINDER INTERNAL-COMBUSTION ENGINE

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Fig. 1.

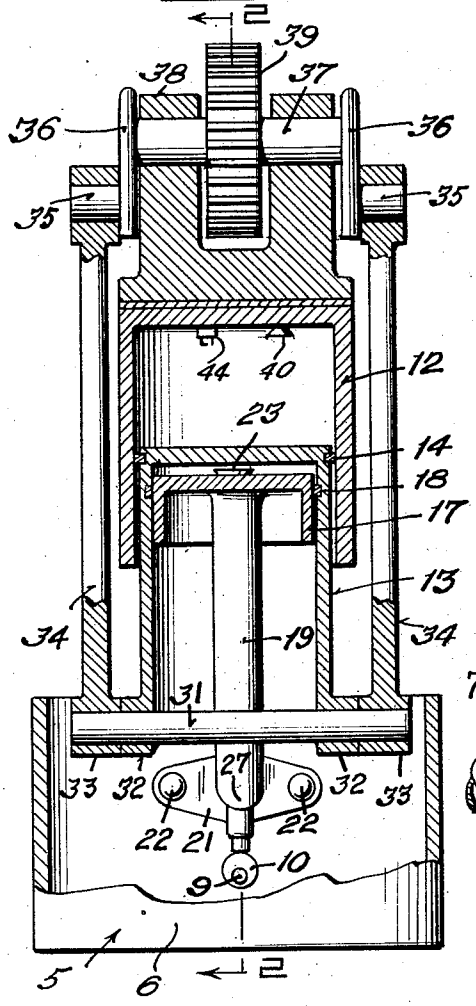
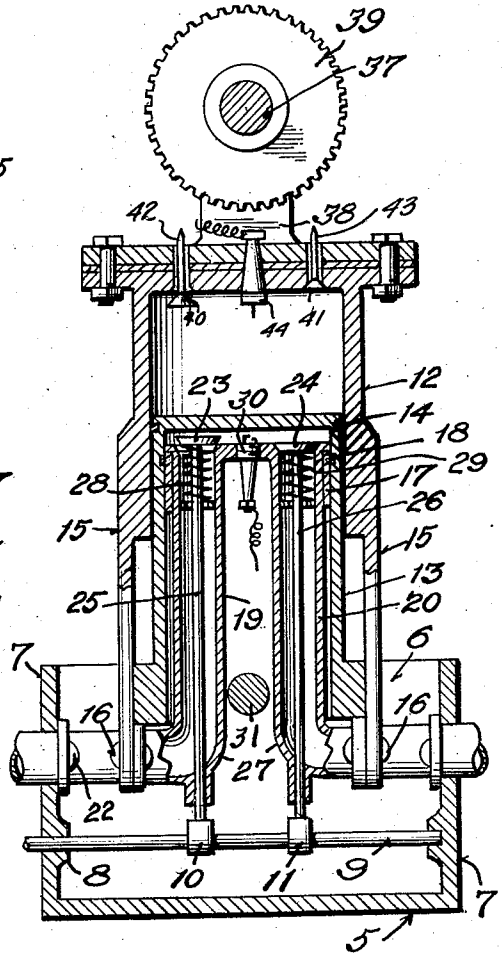


Fig. 2.



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RECIPROCATING CYLINDER INTERNAL-COMBUSTION ENGINE

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3 Claims. (Cl. 123—50)

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This invention relates to the art of internal combustion engines of the type employing a double acting piston.

An important object of the invention is to provide an engine of the double acting piston type wherein the parts are of simple construction and arranged in such a manner as to be readily accessible, positive acting and durable in operation.

Another object of the invention is to provide a double acting piston type engine, which because of its special construction and arrangement of parts, it is capable of being manufactured in a less over-all size than is possible in engines of this type heretofore marketed.

Still another object of the invention is to provide an engine of this character, wherein friction is reduced to a minimum, thus lessening wear and the occasion for periodic inspection and replacements.

These and various other objects and advantages of the invention will become apparent to the reader of the following description.

In the drawing:

Figure 1 is a fragmentary vertical sectional view, through the engine;

Figure 2 is a section taken substantially on line 2—2 of Figure 1.

Referring to the drawing, numeral 5 denotes a base having side walls 6 and end walls 7, the end walls 7 having thickened portions 8, formed with openings to receive portions of a cam shaft 9 having cams 10, 11 thereon, for operating the valves, later to be described.

A cylinder 12, is open at its bottom to receive a hollow piston 13, which at its upper portion has suitable packing means 14 for riding contact with the inside of the cylinder 12. The cylinder 12 has a pair of depending legs 15 suitably secured as at 16 to lugs on the lower portion of the piston 13. Located within the hollow piston 13 is a short piston 17 having packing means 18, against which the inside of the piston 13 wipes, the piston 17 being held stationary through the medium of a pair of conduits 19, 20 representing the intake and exhaust lines of the engine, these conduits 19, 20 extending downwardly into the base 5 and laterally through the end walls 7, the conduits being held in place by flanges 21 bolted or otherwise secured as at 22, to the end walls. The upper ends of the conduits open through the top of the inner stationary piston 17 where valves seats are located for accommodating intake and exhaust valves 23, 24, respectively, rods 25, 26 respectively, depending

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from these valves and through the elbow portions 27 thereof to ride the cams 10, 11, springs 28, 29 respectively, being connected with these rods to normally urge the rods downwardly and with force against the cams 10, 11. A spark plug 30 is provided in the top of the stationary cylinder 17.

A pin 31 extends through bearings 32 in the lower portion of the slide piston 13 and has its ends terminating in bearings 33 at the lower ends of connecting rods 34, 34, which likewise have bearings at their upper ends for receiving the crank pins 35, 35 of crank arms 36, 36 at the ends of a shaft 37, which is journaled through a bifurcated block 38 on the top of the cylinder 12, there being a drive gear 39 partly opening within the bifurcated block 38 and being suitably keyed or secured in a desired manner to the shaft 37.

An intake valve 40 and an exhaust valve 41 are provided in the cylinder 12 and are provided, respectively, with stems 42 and 43 which are operated in conventional manner. A spark plug 44 is also provided in the cylinder 12.

In the operation of the engine using the double acting piston of the type above described, the piston 13 moves up in the cylinder 12, compressing the air and fuel mixture between their respective heads, and while air and fuel mixture is being drawn in the space between the respective heads of the piston 13 and the stationary piston 17, through an intake in the piston 17.

At the top of the stroke, the compressed gases between the pistons 12, 13 are ignited by a spark and combustion takes place, the expanding gas forcing the piston 13 downward, compressing the air and fuel mixture between the piston 13 and 17.

At the end of the down stroke, the compressed gases between the pistons 13 and 17 are ignited and the expanding gases force the piston 13 upward and the gases between the pistons 12 and 13 are forced out the exhaust valve 41 in the cylinder 12.

On the following down stroke, the intake valve 40 in the cylinder 12 allows air and fuel to be taken in between the cylinder head and the piston 13 and the gas between the piston 13 and piston 17 are forced out the exhaust in the stationary piston 17.

While the foregoing description sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and materials may be resorted to, without de-

parting from the spirit and scope of the invention as claimed hereinafter.

Having described the invention, what is claimed as new is:

1. An engine of the character described comprising a stationary piston, a base, supporting means on the base for the stationary piston, a slide piston on the stationary piston containing a combustion chamber between itself and said stationary piston, ignition means in the chamber, fuel intake and exhaust means on the stationary piston, a cylinder in which the slidable piston operates, supporting means for the cylinder, a crank shaft mounted on the cylinder and having power take-off means and connecting means between the crank shaft and the lower portion of the said slide piston, said connecting means comprising a crank on each end of the crank shaft, a connecting rod extending from each crank, said slide piston being provided with bearings at its lower portion, a shaft extending through the bearings and to which the crank rods connect.

2. An engine of the character described comprising a stationary piston, a base, supporting means on the base for the stationary piston, a slide piston on the stationary piston containing a combustion chamber between itself and said stationary piston, ignition means in the chamber, fuel intake and exhaust means on the stationary piston, a cylinder in which the slidable piston operates, supporting means for the cylinder, a crank shaft mounted on the cylinder and having power take-off means and connecting means between the crank shaft and the lower portion of the said slide piston, said intake and exhaust means consisting of conduits extending from openings in the stationary piston to the base and laterally through side portions of the base, valve elements operative in said openings

and having valve stems extending therefrom and downwardly through the conduits and through openings in the lower portions thereof, and a cam shaft having cams against which the rods bear.

3. An engine of the character described comprising a stationary piston, a base, supporting means on the base for the stationary piston, a slide piston on the stationary piston containing a combustion chamber between itself and said stationary piston, ignition means in the chamber, fuel intake and exhaust means on the stationary piston, a cylinder in which the slidable piston operates, supporting means for the cylinder, a crank shaft mounted on the cylinder and having power take-off means and connecting means between the crank shaft and the lower portion of the said slide piston, said cylinder being provided with a bifurcated block on the head portion thereof and through which the crank shaft is journaled, said power take-off means consisting of a gear partly operating in the bifurcated block and being secured to said crank shaft.

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