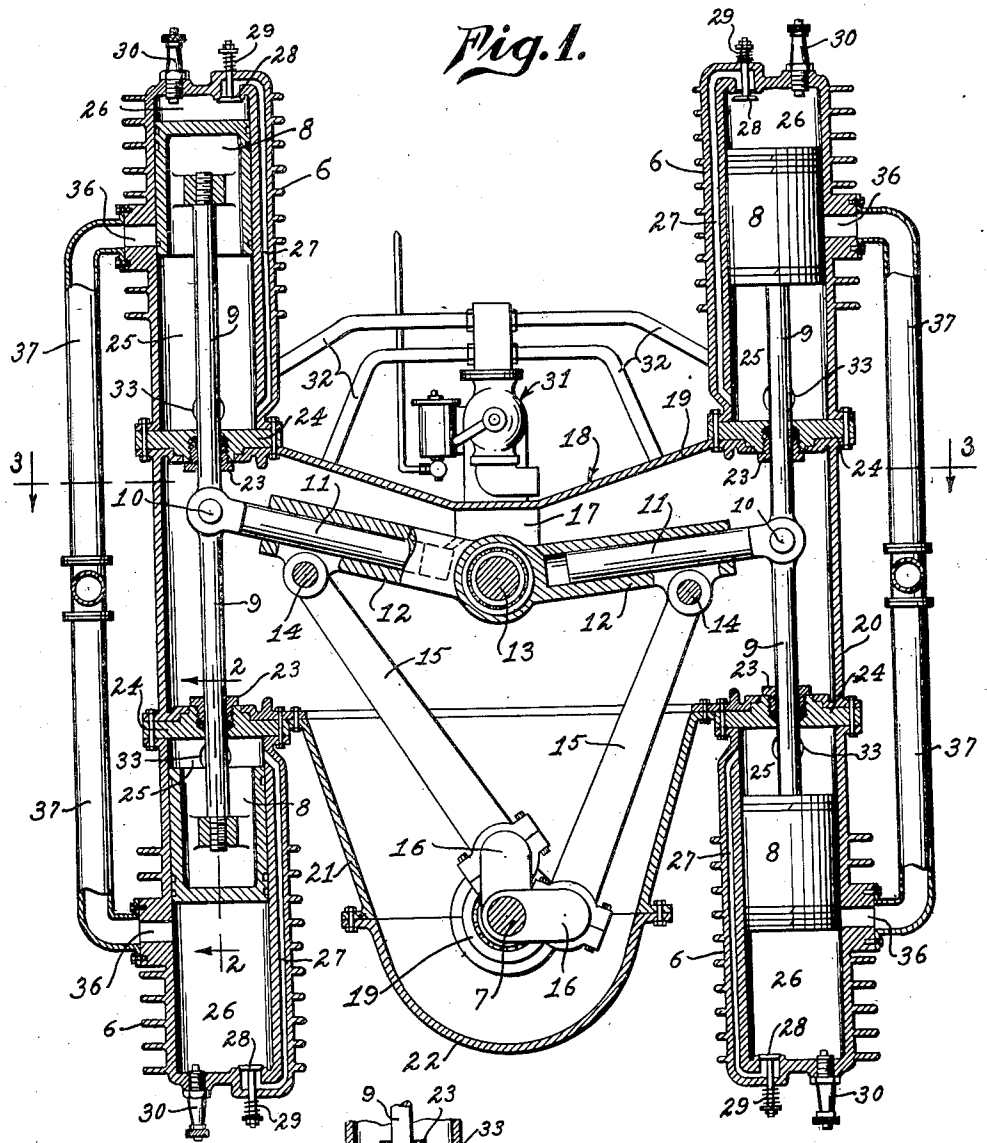
June 10, 1930. W. DELFINO 1,762,614

INTERNAL COMBUSTION MOTOR

Filed Sept. 24, 1928

Fig. 1.



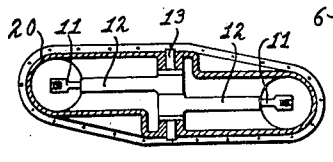


Fig. 3.

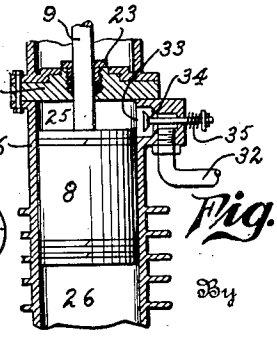


Fig. 2.

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UNITED STATES PATENT OFFICE

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INTERNAL-COMBUSTION MOTOR

Application filed September 24, 1928. Serial No. 307,932.

This invention relates to internal combustion motors, and the embodiment illustrated in the drawings is a two cycle type of motor or, in other words, there is a power impulse for every cycle of each piston.

An important object of the invention is the construction of a motor having comparatively few wearing parts.

Another very important object is to eliminate all side thrust on the pistons so that the wear on the pistons and on the cylinders will be approximately uniform on all sides.

A reduction in weight per horse-power is another very important object of the invention.

Other objects and advantages will appear in the subjoined detailed description.

The accompanying drawings illustrate the invention:

Figure 1 is a view, mainly in vertical section, of a motor constructed in accordance with the provisions of this invention.

Figure 2 is a fragmental vertical section on the line indicated by 2—2, Figure 1.

Figure 3 is a plan section on the line indicated by 3—3, Figure 1.

Referring to the drawings, there are provided oppositely arranged pairs of cylinders 6, the pairs being slightly offset with respect to each other so as to facilitate proper connection of the crank shaft 7 with the pistons 8, which work in the cylinders 6.

The connections between the crank shaft 7 and the pistons 8 are constructed as follows: The pistons 8 of each pair are connected by a rod 9, and pivoted at 10 to each of the rods 9 is a slide member 11 working in a guide 12. In this instance the guides 12 are tubular and the members 11 have cylindrical portions that work in said guides. The inner ends of the guides 12 are mounted to oscillate on a pivot or shaft 13.

Pivoted at 14 to the outer end portion of each of the guides 12 is a pitman 15, and each piston connects with a crank arm 16 of the shaft 7.

The pivot 13 is suported by a bracket 17 that extends downwardly from the top wall of a crank-case 18 and the crank shaft 7 is mounted in bearings 19 supported by the crankcase 18.

The crank-case 18 comprises a cover plate 19, an upper section 20 that encloses the slides 11, guides 12 and the upper end portions of the pitmen 15, an intermediate section 21, that encloses the lower end portions of the pitmen, and a bottom section 22 that holds the oil for lubrication. The lower ends of the upper cylinders are bolted to the cover 19 and section 20 and the upper ends of the lower cylinders are bolted to the sections 20, 21.

The rods 9 pass through packing glands 23 positioned in the cylinder heads 24. Thus, the portions of the upper cylinders below their pistons and the portions of the lower cylinders above their pistons constitute combustible mixture pre-compression chambers 25 which, accordingly, are formed by the inner end portions of the cylinders. The outer end portions of the cylinders form the compression and combustion chamber 26. In each cylinder 6 is a conduit 27 that connects the chamber 25 with the chamber 26 so that fluid compressed in the chambers 25 will be forced by the out stroke of the pistons into the chambers 26. Each of the conduits 27 has at its discharge end a check valve 28 which is loaded by a spring 29. The check valves 28 open inwardly with respect to the chambers 26.

Each cylinder is provided in its compression chamber 26 with an igniter 30 which, in this instance, is illustrated as a spark-plug.

Mounted on the top of the crank-case is a carburetor 31 and the intake piping 32 connects the carburetor with the various compression chambers, each of which is provided with an intake port 33 with which the piping 32 communicates, each port 33 being controlled by an inlet valve 34 that operates automatically. The ports 33 communicate with the air compression chambers 25. Each inlet valve 34 is loaded with a spring 35 so that it will only open after the difference between the atmospheric pressure and the pressure in the chamber 26 reaches a predetermined value.

Each cylinder is provided with an exhaust

port 36 with which communicates exhaust piping 37. The exhaust ports 36 are somewhat nearer the outer ends of the cylinder than the inner ends so that the burnt gases will begin to exhaust through the exhaust ports before the pistons reach the ends of their outstroke.

The invention operates as follows: Assuming that the moving parts are in the positions illustrated in Figure 1, it will be seen that the upper left piston is just starting on its power and air and fuel compressing stroke, that the lower left piston is just starting on its scavenging stroke, that the upper right piston is almost midway of its power and air and fuel compressing stroke, and that the lower right piston has almost reached the middle of its compression stroke.

Thus, in the upper left cylinder, the valves 28 and 34 being closed, the gases have been ignited and are driving the associated piston downwardly to compress a combustible charge below said piston; in the lower left cylinder the burnt gases are being expelled through its exhaust port 36, the valve 28 being closed and the valve 34 being open; in the upper right cylinder, the valve 28 being open and the valve 34 being closed, a combustible charge compressed in the chamber 25 is being admitted to the chamber 26; and that in the lower right cylinder, the valve 28 being closed and the valve 34 being open, compression of the charge in the chamber 26 has just begun, since the piston has just closed the exhaust port 36. In the lower left and right cylinders, since the valves 34 are open, gas is being drawn into said cylinders through the piping 32 and said gas mixes with the air in the air chambers of said cylinders so that when the next cycle occurs the combustible mixture will pass from the air chambers of said cylinders into the compression chambers thereof.

It is to be noted that, because of the construction above described for connecting the piston with the crank shaft, there is no pressure exerted laterally against the rods and, accordingly, there is no lateral pressure of the pistons within their cylinders. All of the forces received by the rods 9 from the pistons and transmitted to said pistons are exerted substantially axially of said rods.

I claim:

An internal combustion motor comprising opposite pairs of cylinders, pistons dividing the cylinders into combustion and pre-compression chambers, conduits connecting the combustion chambers with the pre-compression chambers, check valves for said conduits, igniters for the combustion chambers, combustion chambers being provided with exhaust ports controlled by the pistons, the pre-compression chambers being provided with inlet ports, valves for the inlet ports, a rod connecting the pistons of each pair, a shaft, guides mounted to oscillate on said shaft and projecting in opposite directions, slide members working in the respective guides and pivoted to the respective rods between the cylinders of the respective pairs, a second rotatably mounted shaft provided with cranks, and pitmen pivotally connected with the guides and engaging the cranks.

Signed at Bakersfield, Calif., this 15th day of September, 1928.

WILLIE DELFINO.