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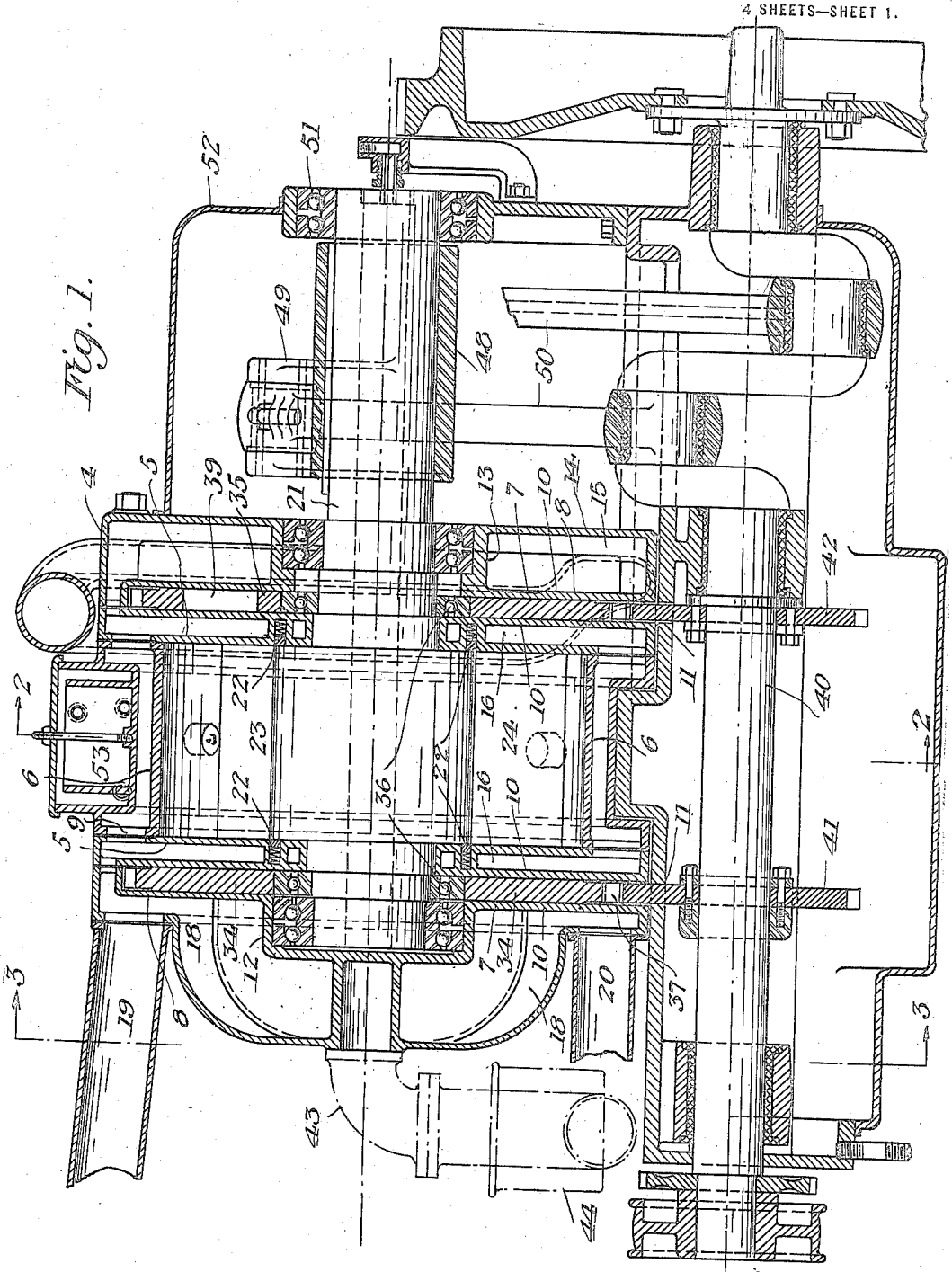
APPLICATION FILED AUG. 18 1917.

1,283,375.

Patented Oct. 29, 1918.

4 SHEETS—SHEET 1.

Fig. 1.



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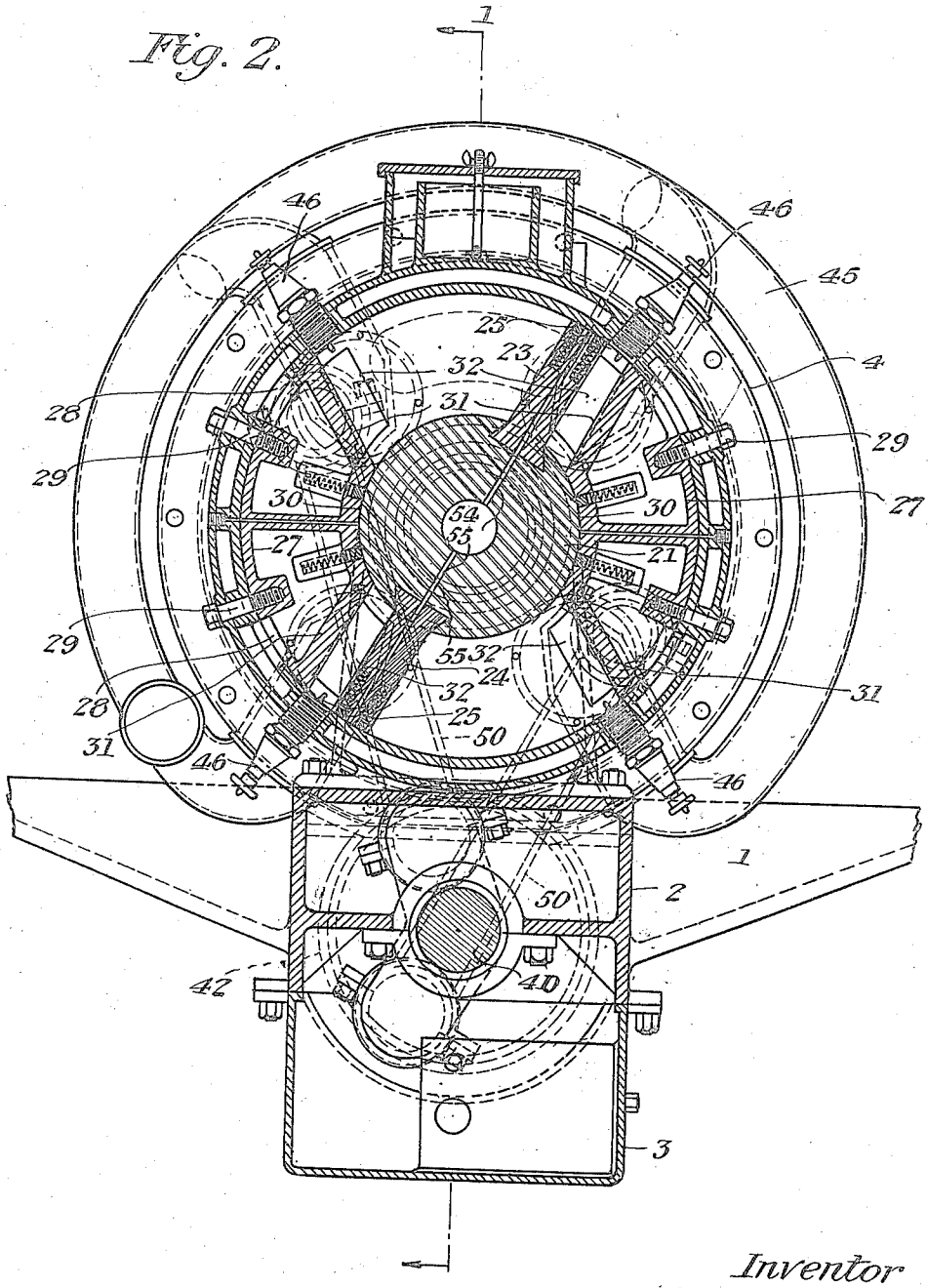
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4 SHEETS—SHEET 2.

Fig. 2.



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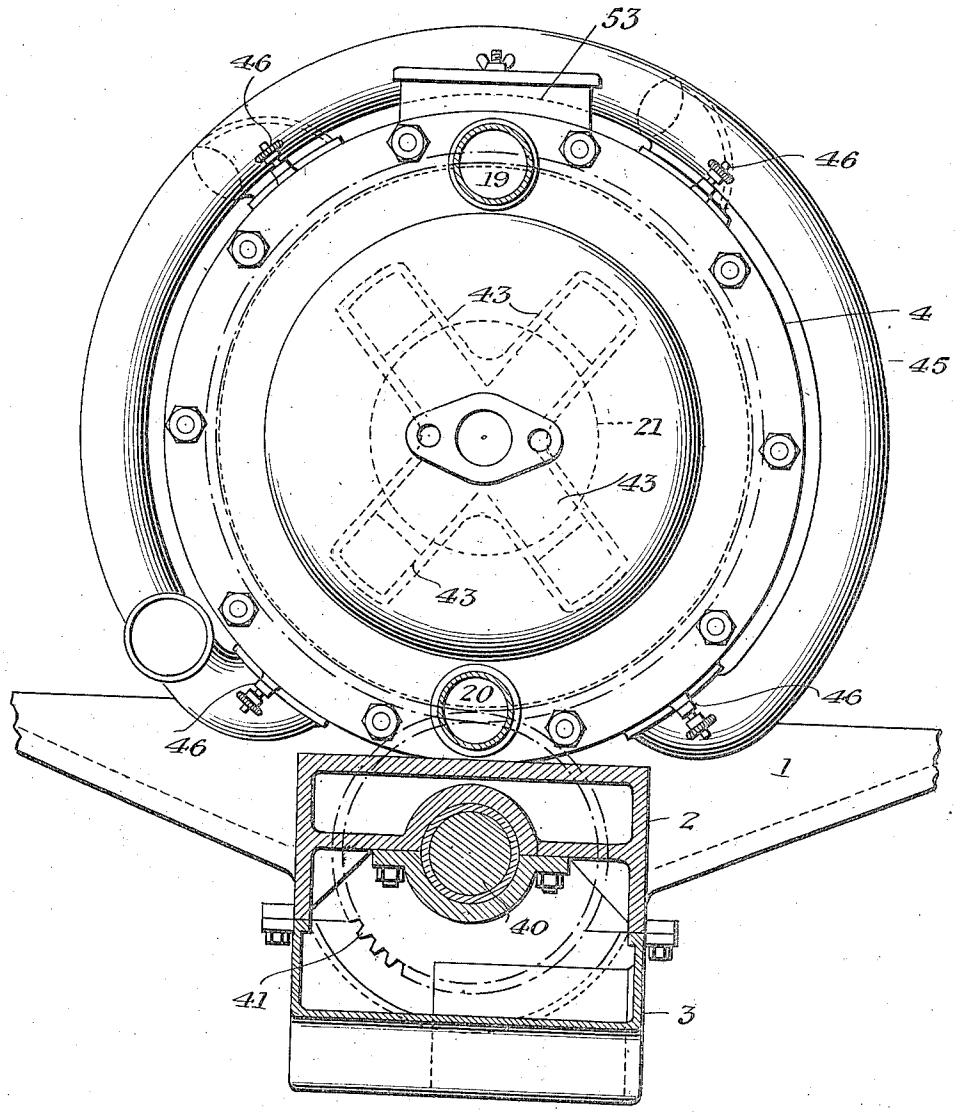
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

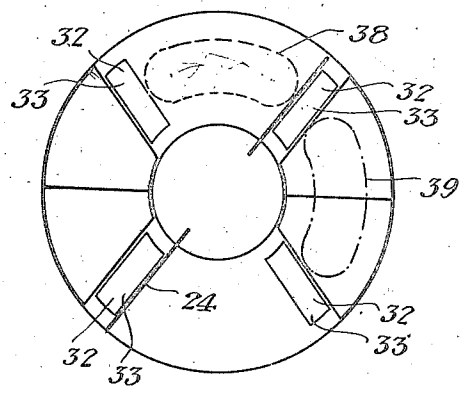


Fig. 5.

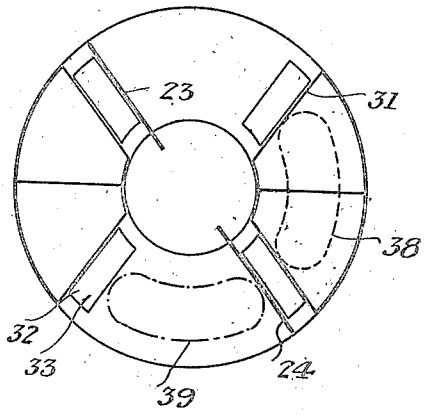


Fig. 6.

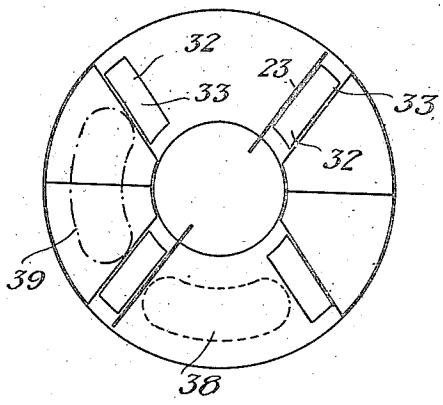
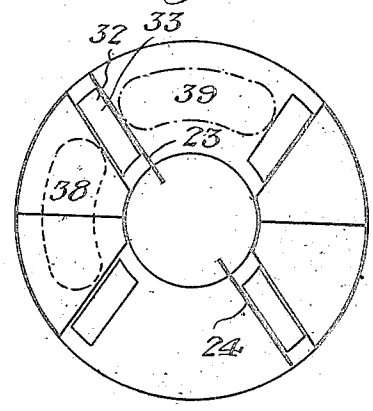


Fig. 7.



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UNITED STATES PATENT OFFICE.

ADOLPH VLK, OF CHICAGO, ILLINOIS, ASSIGNOR TO V-L-K OSCILLATING MOTOR SYNDICATE, OF CHICAGO, ILLINOIS.

ENGINE.

1,283,375. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed August 18, 1917. Serial No. 186,947.

To all whom it may concern:

Be it known that I, ADOLPH VLK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Engines, of which the following is a specification.

This invention relates to an improvement in internal combustion engines, wherein diametrically-opposed relatively-fixed pistons are arranged for a reciprocating movement with each movement or semi-stroke of one or the other of the pistons a power or firing stroke, to impart continuous power to a crank-shaft.

The invention is directed to providing a pair of opposed pistons, radiating from a common center, and each operating in an independent cylinder or chamber provided with an inlet and with an exhaust port at each end. Rotary valves are geared from a common source, and timed to successively connect an inlet port at the respective ends of a piston chamber to a fuel source, and also successively connect an exhaust port at the respective ends of a piston chamber to an exhaust manifold. The valves control the respective chambers in succession, and are so timed that each piston is under a power or firing stroke in both directions of one full cycle thereof, each piston having two power strokes in successive order. As one piston is under its power strokes, the valves are permitting the clearing and charging of the other piston, hence each semi-stroke of the pistons is a power stroke, and the power is therefore continuous. The valve ports are so formed as to provide for a full charge and a complete scavenging of the chambers at each operation.

The invention in a simple and preferred construction will be described in the following specification, reference being had to the accompanying drawings, in which:—

Figure 1 is a central longitudinal vertical section through the improved engine, taken on the line 1—1, Fig. 2.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section on the line 3—3 of Fig. 1.

Figs. 4, 5, 6, and 7 are diagrammatic views, illustrating the successive positions of the pistons and valves throughout a complete cycle of movement, the valves being shown as common, as are also the inlet and exhaust ports.

The improved engine is here shown as conventionally comprising a base 1, having a hollow crank-case portion 2, arranged centrally of the base, and closed by the usual removable section 3.

An engine block or casing 4 is arranged above and removably secured to the base. The casing is approximately cylindrical in elevation, and is centrally provided with spaced partitions 5, which inwardly of and concentric with the casing wall are connected by an annular wall 6. The space between the partitions 5 and the wall 6 forms the piston cylinders or chambers, as will later appear.

Beyond the partitions 5, in each direction, are arranged valve chambers 7, each formed by spaced partitions 8, and an end-closing wall 10. The valve chambers 7 extend to the base 1, and communicate with the crank case of the latter through openings 11, through which the operating means for the valves extend, as hereinafter noted. The valve-chambers are spaced from the piston chamber, the spaces between the said chambers being in communication beyond the wall 6, through openings 9 in the partitions 5.

One of the valve-chamber partitions 8 of that valve chamber next to what may be termed the inlet end of the engine is arranged to provide a closed bearing offset 12, a similar bearing wall 13 being formed from the other valve-chamber partition 8, as shown. The bearing 12 is closed against the casing, while the bearing wall 13, is through a partition 14, utilized to provide a water space 15. The water or cooling medium space includes the spaces 15, the spaces 16 between the piston chamber and the valve chambers, and a space 18 beyond the valve chamber at the inlet end of the engine, the latter space being enlarged, and having an inlet 19 and outlet 20.

A piston or power shaft 21 is arranged axially of the casing, being mounted, within the casing, in suitable bearings in offset 12 and on wall 13. The shaft is of increased diameter within the piston chamber, and stepped in both directions beyond such chamber. The side partitions of the piston

chamber and adjacent valve chambers are formed beyond the shaft enlargement with annular spaces, closed against the water space, to receive bearing rings 22, preferably spring pressed, and bearing against the ends of the shaft 21 within the piston chamber to insure a non-leaking joint.

Pistons 23 and 24 are secured to the power shaft 21, extending throughout the enlarged portion of such shaft, and fitting the piston chamber beyond the shaft. The pistons are arranged diametrically of the shaft, and are solid, except for an oil duct, spring-pressed packing sections 25 insuring a gas tight bearing of the pistons against the wall 6. The inner ends of the pistons are preferably enlarged and dovetailed into the shaft to form a rigid connection.

The pistons are thus mounted in wholly independent chambers, and reciprocate in said chambers, imparting a rotary reciprocating movement to the shaft. The space between the piston chambers is taken up with abutment blocks 27. These blocks are hollow, and in open communication with the water space at 28, and are bolted or otherwise secured at 29 to the annular wall 6. The inner walls 30 of the blocks bear on or form a bearing for the shaft 21, while the end walls 31 of such blocks form the end limits of the respective piston chambers.

The partition 5 toward the inlet end of the engine is formed adjacent each abutment block end wall 31 with an opening 32, the opposing partition 5 being similarly formed with identical openings 33. The openings 32 are inlet openings, while the openings 33 are exhaust openings. The construction involves two inlet openings and two exhaust openings for each piston chamber, these respective openings being located at opposite sides of the piston chamber, and one at each end thereof.

Mounted in each valve chamber is a valve, one, as 34, being in the valve chamber adjacent the inlet end of the engine, and hereinafter termed the inlet valve, and the other, as 35, being arranged in the remaining valve-chamber and herein-termed the exhaust valve. These valves are identical in construction, each comprising a disk, mounted for independent rotation on the shaft 21, as through bearings 36, and having peripheral gear teeth 37, for operating purposes.

The valves are each formed with a single opening, 38, 39, respectively, and these openings successively register with the openings or ports (inlets or exhausts, as the case may be), of the piston chambers in the rotations of the valves. The piston chamber inlet and exhaust ports are, of course, closed against the water space between the piston chamber and the valve chambers. A crank shaft 40 is mounted in the crank case, and has gears 41 and 42, which extend through the openings 11 in the valve chambers, and mesh with the respective valves, to continuously operate the latter. The relative positions of the valve openings 38 and 39 is thus constantly maintained.

The ports 32 are inlet ports and the fuel is admitted to such through the inlet valve opening, as the latter registers with such ports. Beyond the inlet valve there is arranged an inlet manifold 43, having an outlet therefrom opening into the inlet valve chamber directly opposite each inlet port 32, the manifold leading from a carbureter, or the like, 44, arranged beyond the engine casing. The inlet manifold is thus entirely within the water space of the casing, and the heat of the water is thus utilized as a vaporizing agent. The ports 33 are exhaust ports, and communicate, through the opening of the exhaust valve, with an exhaust manifold 45, which preferably partially encircles the engine casing, and has, of course, an inlet opening, in alinement with each of the ports 33.

An ignition element, here shown as a spark plug 46, is arranged at each end of the piston chamber, preferably in line with the opposed inlet and exhaust ports. The ignition timing forms no part of the present invention, it being understood that the timing is such as to fire the plugs successively, that is the two plugs for one chamber, one after the other, and then the plugs of the other chamber successively. The firing order is however, in the instance shown, successively in a clock-wise direction.

The shaft 21 is extended beyond the bearing 13, and is provided on such extension with a sleeve 48, keyed in place, and having offset, oppositely projecting rocker arms 49, connected by pitman 50 to the cranks of the crank-shaft 40. The throw of the rocker arms under the influence of the pistons will revolve the crank shaft. The end of the shaft 21 is provided with a terminal bearing 51, supported from the base, and is protected by a housing 52 secured to the casing.

In Figs. 4 to 7 is shown diametrically the successive positions of the pistons and valves in a complete cycle of operation. In these figures the valves are shown as one, the inlet and exhaust openings being indicated in their relative positions, and the inlet and exhaust ports of the piston chambers are also shown as common.

Assuming Fig. 4 the initial or starting position, it will be noted that piston 23, in moving toward the right, has drawn in a fresh charge through port 38 of valve 34, which port has through at least three-fifths of the full movement of the piston has been in registry with chamber inlet port 32. This movement of the said piston has also forced the previously fired gases through the ex-

haust port 33 of the chamber and through port 39 of valve 35. During this stroke of piston 23, the opposite piston 24 has had a firing stroke. The movement of piston 23 in the opposite direction, under a second firing stroke of piston 24, compresses the charge previously admitted, and as the inlet ports are now passing under the opposite end of the chamber, draws in a second charge on the opposite side of the piston. During this second movement of piston 23, the piston 24 has been exhausting the previously fired gases from the right-hand side of such piston, as the exhaust ports are passing beneath, or in registry with this end of the chamber. The next stroke of the piston 23 toward the right is a firing stroke, during which the piston 24 is drawing in a fresh charge, as the inlet ports are now passing this end of the lower chamber. The next stroke of piston toward the left is a firing stroke, during which the piston 24 is compressing the first charge, and drawing in a new charge on the opposite side. This completes a cycle of movement, throughout which one piston is subjected to two successive firing strokes in opposite directions, while the other piston is clearing and drawing in fresh charges on both sides of the piston. Each stroke is therefore a firing stroke, and the shaft 21, and therefore the crank shaft is under continuous power.

The present invention is not concerned with an oiling system, but there is shown conventionally an oil reservoir 53, for communication with a central bore in shaft 21, which bore 54, through ducts 55, directs the oil to the surface of the pistons.

What is claimed as new is:—

1. In an internal combustion engine, a stationary cylinder having two transverse stationary abutments dividing said cylinder into two chambers, relatively fixed oscillating pistons operating in and dividing the chambers into four combustion spaces, and a single inlet valve communicating with the combustion spaces in succession.

2. In an internal combustion engine, a stationary cylinder having two transverse stationary abutments dividing said cylinder into two compartments, relatively fixed oscillating pistons dividing the two compartments into four combustion chambers, a single inlet valve, a single exhaust valve, both of said valves communicating with all of said combustion chambers in succession.

3. An internal combustion engine having relatively fixed oscillating pistons, and a single inlet valve communicating successively with opposite sides of each piston in succession.

4. An internal combustion engine having relatively fixed oscillating pistons, a single inlet valve communicating successively with opposite sides of each piston in succession, and a single exhaust valve communicating successively with opposite sides of each piston in succession.

5. An internal combustion engine having relatively fixed oscillating pistons, a single inlet valve, and a single exhaust valve, each valve communicating successively with opposite sides of each piston in succession, the exhaust valve operating in advance of the inlet valve.

6. An internal combustion engine having relatively fixed oscillating pistons, a single inlet valve, a single exhaust valve, each valve having a single opening to establish communication with each side of each piston successively, the openings in the valve exceeding one-half the piston movement.

7. In an internal combustion engine, a power shaft, piston chambers arranged beyond the same, a piston fixed to the shaft and operating in each chamber, each chamber being formed with two spaced inlet ports and with two spaced exhaust ports, a single inlet valve communicating successively with all inlet ports, and a single exhaust valve communicating successively with all exhaust ports, each of said valves having a single opening.

8. In an internal combustion engine, a power shaft, piston chambers arranged beyond the shaft, a piston in each chamber and fixed to the shaft, each chamber having spaced inlet ports and spaced exhaust ports, a single inlet valve arranged for successive registry with all inlet ports, a single exhaust valve arranged for successive registry with all exhaust ports, and means for simultaneously and synchronously operating both valves.

9. In an internal combustion engine, a power shaft, a piston chamber on each side of the shaft, a piston operating in each chamber, each chamber having spaced inlet ports and spaced exhaust ports, valve disks loosely mounted on the shaft beyond the chambers and respectively communicating with all the inlet and exhaust ports in succession, a crank shaft operated by the power shaft, and means operated by the crank shaft for actuating the valve disks.

10. In an internal combustion engine, a power shaft, piston chambers arranged on opposite sides of the shaft and closed against each other, each chamber being formed with spaced inlet ports and spaced exhaust ports, an inlet valve disk loosely mounted on the shaft adjacent the inlet ports, an exhaust valve loosely mounted on the shaft adjacent the exhaust ports, an inlet manifold beyond the inlet valve disk, an exhaust manifold beyond the exhaust valve disk, and means for synchronously operating and timing said valves.

11. In an internal combustion engine, opposite pistons, means, including an inlet and

an exhaust valve for successively charging and scavenging opposite sides of each piston in succession, a crank shaft operated by the pistons, and gears secured to the crank shaft for operating the valves.

12. An internal combustion engine having relatively-fixed oscillating pistons, and means including a single rotary valve for successively charging each side of each piston and firing the charges of each piston successively, said valve being retained in full open position during more than one-half of the piston travel.

13. An internal combustion engine having relatively-fixed oscillating pistons, and means including a single rotary valve for charging each side of one piston while the other is under two firing strokes, said valve being retained in full open position during more than one-half of the piston travel.

14. An internal combustion engine having relatively-fixed oscillating pistons, and a single inlet valve communicating successively with opposite sides of each piston in succession, said valve being retained in full open position during more than one-half of the piston travel.

15. An internal combustion engine comprising a cylinder, a piston operating therein, said cylinder having two spaced inlet ports arranged at the opposite limits of stroke movement of the piston, and a single valve for admitting fuel to said inlet ports in succession.

In testimony whereof I affix my signature.

ADOLPH VLK.