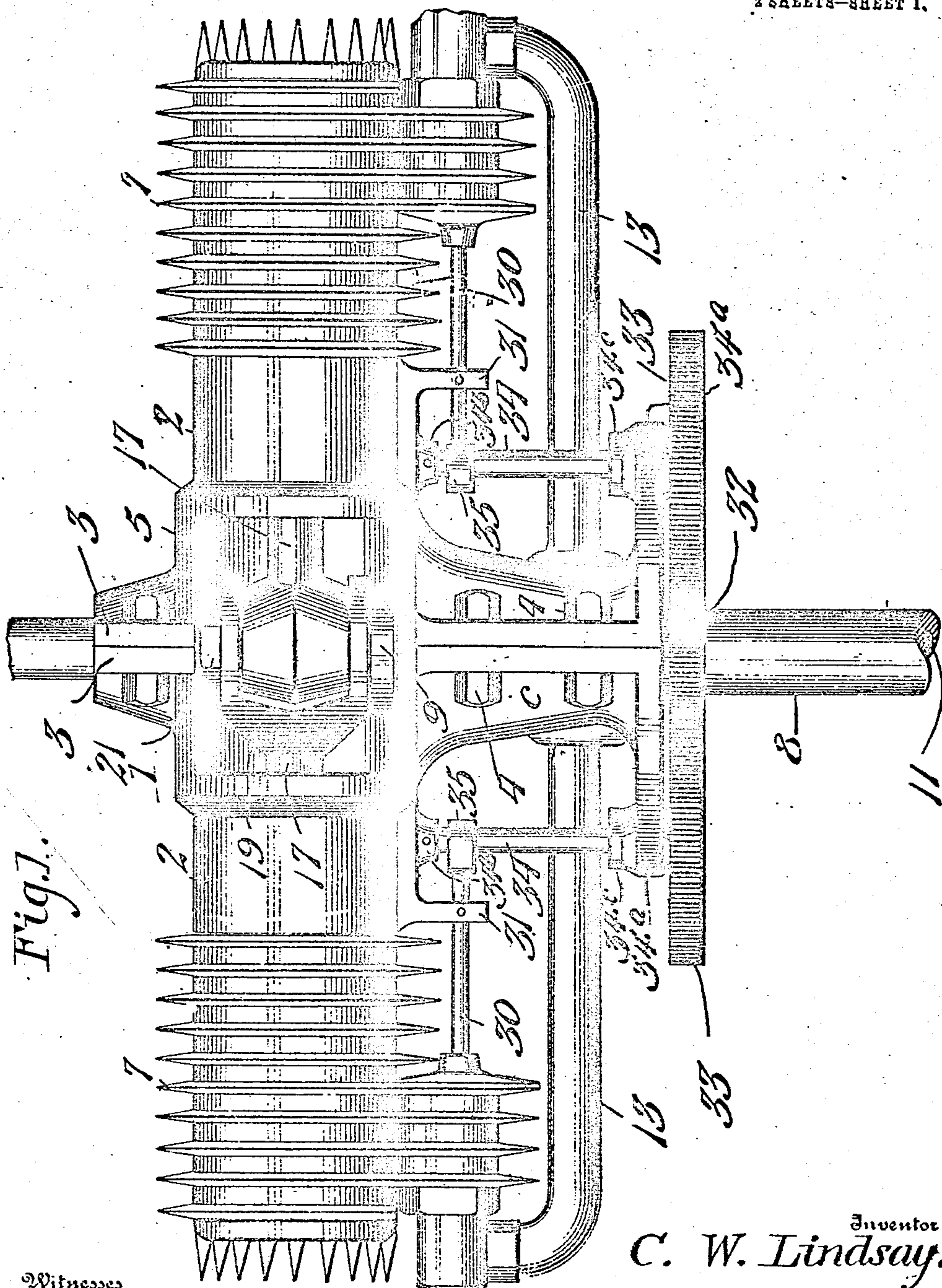


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 ROTARY GASOLENE ENGINE.
 APPLICATION FILED AUG. 23, 1905.

898,903.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.



Witnesses
 Phil E. Barnes,
 G. J. Elmore

Inventor
 C. W. Lindsay.

By Victor J. Evans
 Attorney

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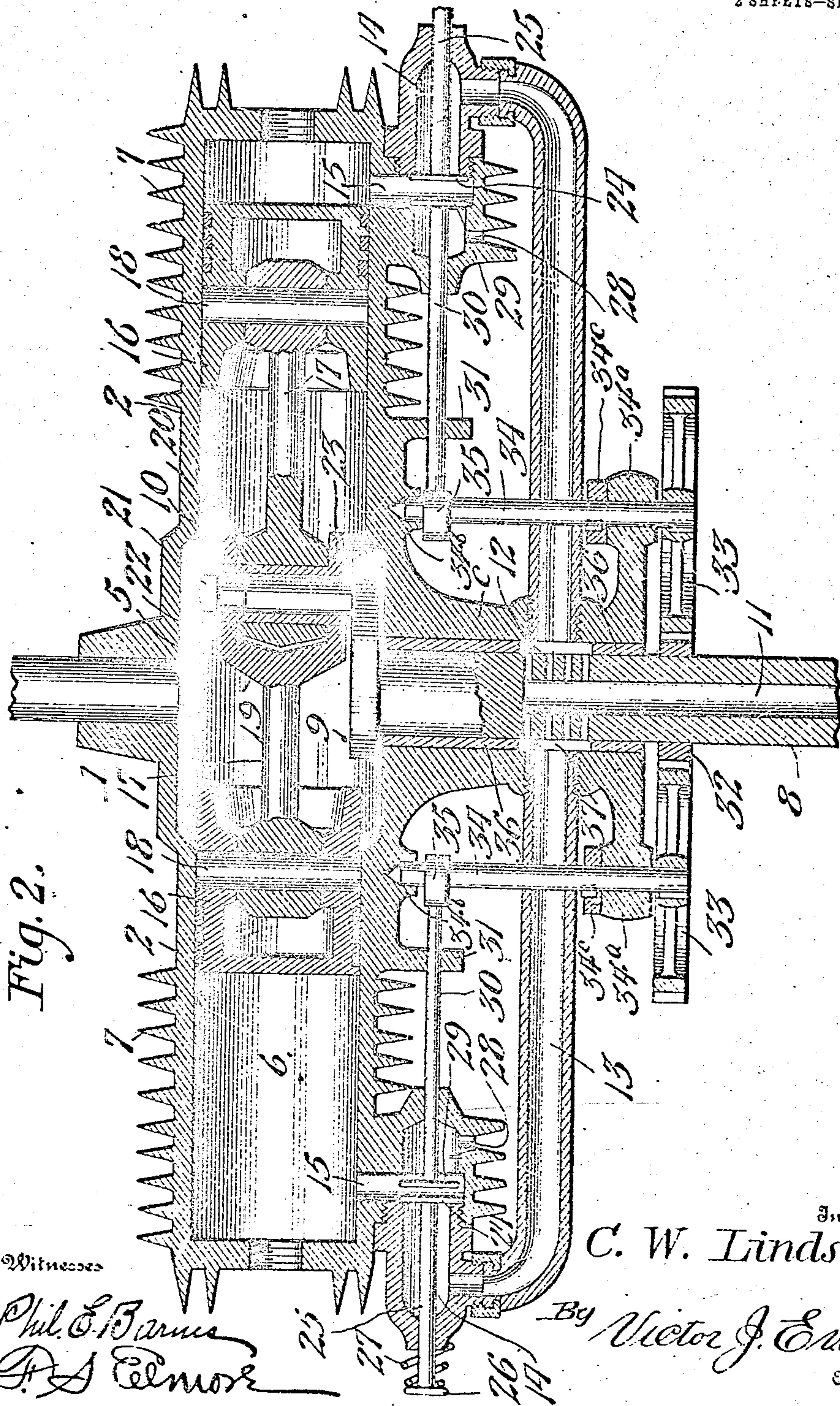


Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES WESLEY LINDSAY, OF ANTHON, IOWA.

ROTARY GASOLENE-ENGINE.

No. 898,903.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed August 23, 1905. Serial No. 275,448.

To all whom it may concern:

Be it known that I, CHARLES WESLEY LINDSAY, a citizen of the United States, residing at Anthon, in the county of Woodbury and State of Iowa, have invented new and useful Improvements in Rotary Gasole-Engines, of which the following is a specification.

This invention relates to rotary explosive gas engines of the duplex type and has for its objects to produce a comparatively simple, inexpensive device of this character in which the gas will be drawn alternately into the cylinders through the hollow crank shaft, one in which the exhaust ports will be positively opened at appropriate intervals and one wherein the cam shaft for actuating said valves will be operated from the crank shaft.

With these and other objects in view, the invention comprises the novel features of construction and combination of parts more fully hereinafter described.

In the accompanying drawings: Figure 1 is a plan view of an engine embodying the invention. Fig. 2 is a horizontal section taken centrally and longitudinally therethrough.

Referring to the drawings, 1 designates the casing composed of a pair of sections 2 provided at their meeting ends with outstanding flanges 3 through which are entered connecting bolts 4, said sections which are open at their inner ends as at 5 being of tubular form to provide cylinders 6, the outer faces of which are equipped with spaced circumferential ribs 7 designed as usual to radiate the heat for cooling the cylinders.

Extending into the casing 1 and having bearing therein is a crank shaft 8 on which the casing and its contained cylinders are adapted to rotate, said shaft, which is provided at its inner end with a crank arm or head 9 carrying an eccentrically disposed wrist pin 10, being preferably of tubular form to provide a central gas-inlet passage 11 communicating through transverse openings 12 with inlet pipes or ducts 13 leading respectively to valve chambers 14 provided on the casing at the outer ends of the cylinders 6 and in turn communicating with the latter through openings or ports 15.

Arranged for reciprocation in the cylinders 6 are pistons 16 provided with connecting rods 17 pivotally engaged with the pistons through the medium of coupling pins 18 entered transversely through the latter and having at their outer ends heads 19 which are

perforated to receive the wrist pin 10 on which latter is loosely arranged a sleeve or bushing 20 retained in place by means of a stud bolt 21 tapped into the end of the pin, it being noted in this connection that one of the heads 19 is of bifurcated form to present a pair of spaced side portions or arms 22 between which the other head 19 is received and that the sleeve 20 has formed at its inner end a projection or feather 23 engaged with a corresponding recess in one of the arms 22 for fixing the bushing to the adjacent head 19 and for rotation therewith upon the pin 21.

Arranged in each of the valve chambers 14 is a movable inlet valve 24 having its stem 25 extended outward through the end of the valve casing and equipped with a head 26 acted upon by a normally expanded spring 27 to maintain the valve closed, there being also arranged in each of the casings, which are provided with exhaust ports 28, a movable exhaust valve 29 having its stem 30 extended through the opposite end of the casing and having bearing beyond the latter in a bearing member or ear 31 formed on the engine casing and suitably perforated to receive the valve stem.

Fixed on the crank shaft 8 is a pinion 32 in mesh with gears 33 in turn fixed on the outer ends of cam shafts 34 journaled in suitable bearings on the casing and each equipped with a cam portion or head 35 and designed to contact with the outer ends of the valve stems 30 for opening the exhaust valves 29, it being understood of course that the movements of the shafts 34 are so timed relatively as to alternately open the valves and at appropriate intervals, and further that that portion of the shaft 8 which enters the casing is surrounded by a pair of sleeves or bushings 36 suitably spaced to present an annular chamber 37 in which the branch passages 12 discharge and which in turn communicates with the adjacent ends of the tubes or ducts 13.

The outer ends of the shafts 34 are mounted in bearings 34^a on the crank bearing-c of the engine, and the inner ends of the shafts are mounted in bearings 34^b arranged on the inner ends of the cylinder. On the secondary shafts 34 are fixed collars 34^c which co-operate with the bearings 34^b so as to prevent longitudinal movement of the secondary shafts for the purpose of maintaining the gear wheels 33 in mesh with the pinion 32.

In practice, supposing the parts to be in the position illustrated in Fig. 2, and a charge

to be compressed in the right-hand cylinder 6, an explosion of said charge will operate the adjacent piston for driving the engine and will at the same time move the opposite piston to exhaust the gases of the previously exploded charge in the other cylinder out through the appropriate exhaust port 28, it being understood of course that during such exhaust the left-hand valve 29 is maintained in open position through the action of the corresponding cam 35. After the gas is exhausted from either of the cylinders the further movement of the corresponding piston opens the adjacent inlet valve 24 and draws a charge of gas through the shaft 8 and duct 13, this charge under continued movement of the piston being compressed as usual for explosion at the proper time. As the charges are alternately exploded in the cylinders for driving their respective pistons, the casing will owing to the shaft 8 being fixed, be rotated thereon, it being apparent that during rotation of the cylinders the cam shafts 34 will through the medium of the gear connections 32, 33, be driven for positively opening the exhaust valves at appropriate periods as heretofore explained, and further that the sleeve or bushing 20 will rotate with the bifurcated head 19 on the pin 10 while the other head 19 will rotate upon the bushing. It is obvious that under this arrangement separate wearing faces are presented for each of the connecting rod heads and that wear on the connecting rods 17 is measurably decreased. It is also to be observed that owing to the casing being cast in two similar sections adapted for connection by the bolts 4 the cost of the device as a whole is materially decreased, inasmuch as the same mold may be employed for forming the casing sections and that as the sections are in all respects identical their proper assemblage is facilitated. Furthermore, as the cylinders revolve the air circulating through the ribs 7 will insure rapid radiation of the heat and effectual cooling of the cylinders, while the latter will perform the functions and obviate the employment of a fly wheel.

From the foregoing it is apparent that I produce a simple device admirably adapted for the attainment of the ends in view, it being understood that minor changes in the details herein set forth may be resorted to without departing from the spirit of the invention. Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an engine, the combination of a pair of sections each comprising a cylinder and half a crank chamber, bolts for connecting the sections together, bearings formed on the

sections and lying in the plane of division thereof, a crank shaft mounted in the bearings and having a bore extending short of the inner end thereof and provided with a plurality of transverse passages leading out of the bore, sleeves in one of the shaft bearings and arranged in spaced relation to form a chamber into which the said passages discharge, pistons in the cylinders, connections between the pistons and crank shaft, a valve chamber on each cylinder, an inlet valve in each chamber, an exhaust valve in each chamber, stems on the exhaust valves extending parallel with the cylinders and disposed on opposite sides of the crank shaft, bearings on the cylinders for the valve stems, secondary shafts disposed parallel with the crank shaft, bearings on the cylinders for the inner ends of the secondary shafts, oppositely disposed bearings on one of the crank shaft bearings for the secondary shafts, a pinion on the crank shaft, and gear wheels on the secondary shafts meshing with the pinion.

2. In an engine, the combination of a crank shaft, cylinders rotatably mounted thereon, bearings connected with the cylinders and divisible in the plane of the crank shaft, webs on the bearings, bolts passing through the webs, a supply conduit carried by the crank shaft, a chamber in one of the bearings, valveless ports between the conduit and chamber, valve chambers on the cylinders, pipes having their inner ends threaded in the chamber-containing bearing and communicating through the ports with the said conduit, detachable connections between the outer ends of the pipes and valve chambers, each pipe being removable with its respective cylinder of the engine, an exhaust valve in each chamber, a valve gear for each exhaust valve removable intact with the adjacent cylinder, a pinion on the crank shaft, each gear comprising a secondary shaft disposed parallel with the crank shaft and extending across the adjacent supply pipe, bearings formed one on the cylinder and the other on the crank shaft bearing for the said secondary shaft, a cam on the inner end of the secondary shaft, a stem on the exhaust valve arranged in cooperative relation with the cam, a guide arranged on the cylinder for the stem, and a gear wheel on the outer end of the secondary shaft arranged to mesh with the pinion.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES WESLEY LINDSAY.

Witnesses:

D. H. HAWTHORNE,
L. R. MYERS.