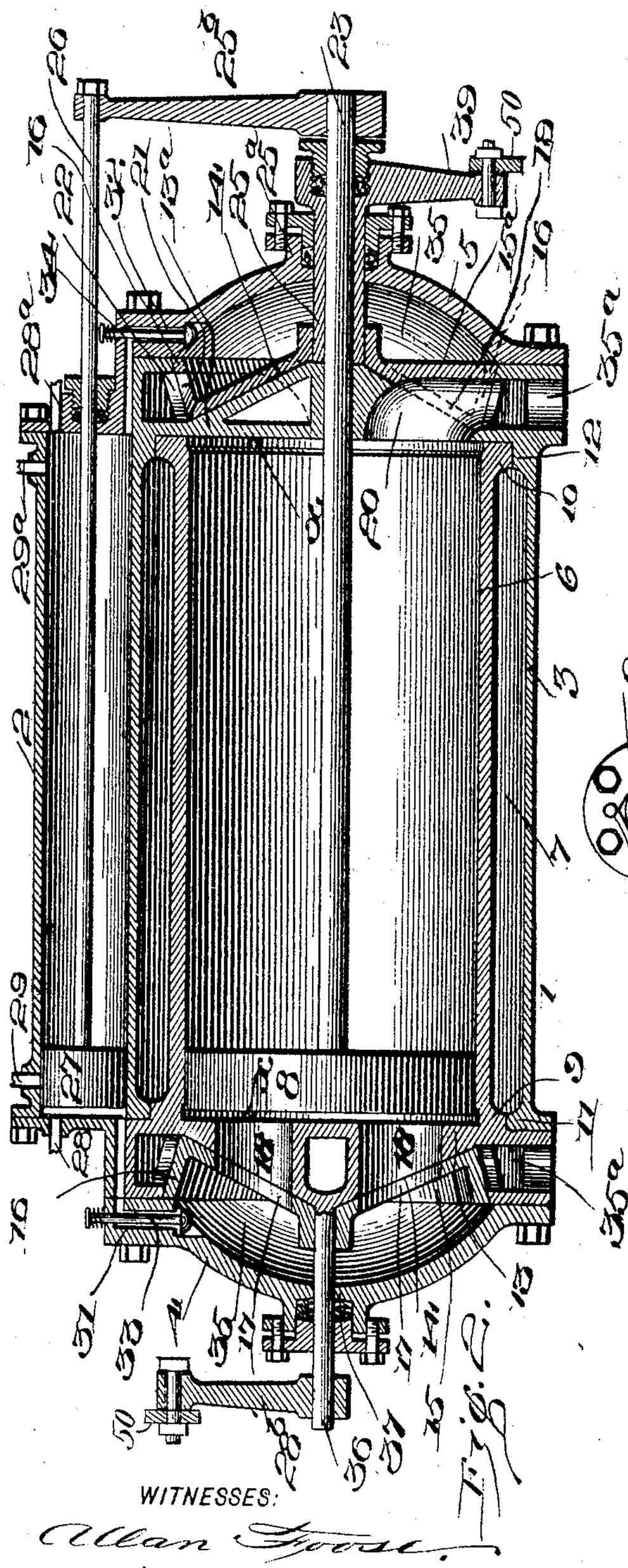
No. 779,509. PATENTED JAN. 10, 1905.

N. W. TRAVISS.

GAS ENGINE.

APPLICATION FILED AUG. 11, 1903.

2 SHEETS—SHEET 1.



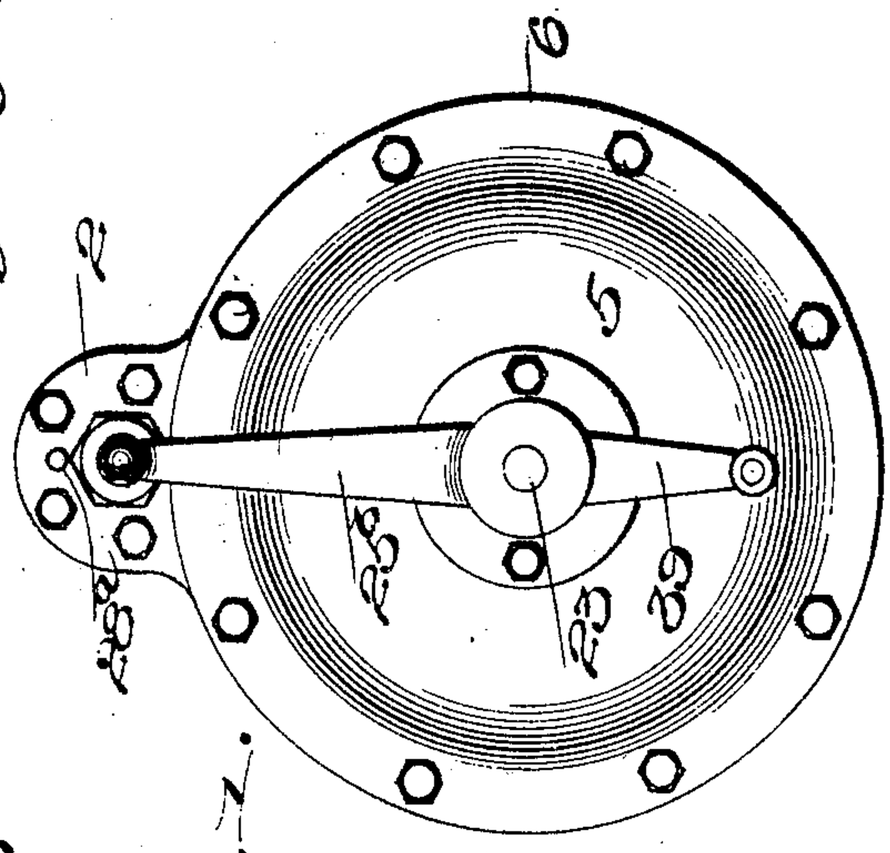


Fig. 1.

WITNESSES:

Allan Goose.

J. L. Sykes.

INVENTOR

Norman W. Traviss,

BY

J. R. Littell

HIS ATTORNEY.

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2 SHEETS—SHEET 2.

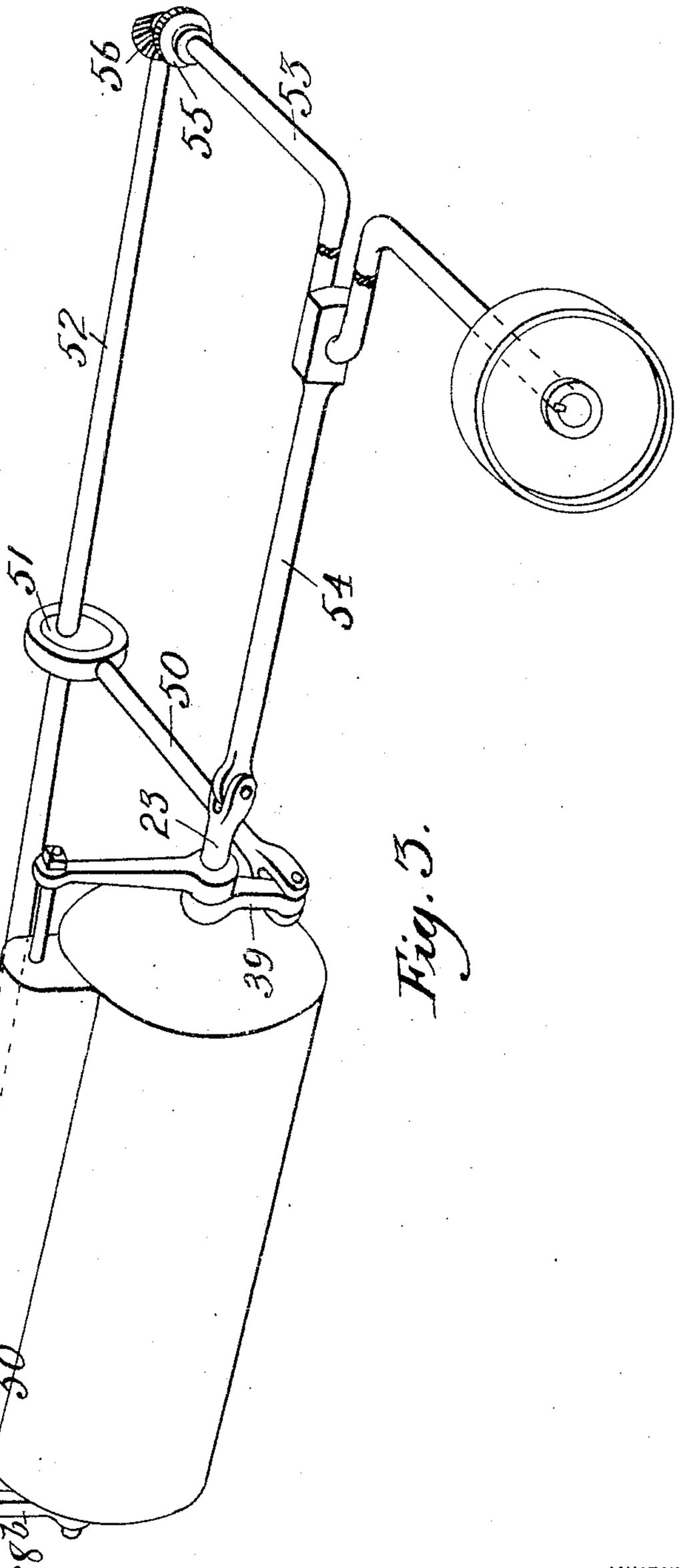

Fig. 5.

WITNESSES:

B. L. Molitor.

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His ATTORNEY.

No. 779,509. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

NORMAN WESLEY TRAVISS, OF ST. THOMAS, NORTH DAKOTA.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 779,509, dated January 10, 1905.

Application filed August 11, 1903. Serial No. 169,063.

To all whom it may concern:

Be it known that I, NORMAN WESLEY TRAVISS, a citizen of the United States, and a resident of St. Thomas, in the county of Pembina and State of North Dakota, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to gas-engines, and has for its object to provide a gas-engine which will give one explosion to each stroke of the piston or two impulses to every revolution of the crank-shaft, and, further, to provide a gas-engine of the character set forth which will possess advantages in point of simplicity, inexpensiveness, and efficiency.

In the drawings, Figure 1 is an end view of the gas-engine, and Fig. 2 is a longitudinal vertical sectional view. Fig. 3 is a diagrammatic view showing the engine and means for transmitting power from the piston thereof to a crank-shaft and from the crank-shaft to the cam-shaft.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring to the drawings, 1 designates the casing of the engine, comprising an upper compression-cylinder 2, a lower cylinder 3, and heads 4 and 5, covering the ends of said cylinders. An explosion-cylinder 6 is positioned in the cylinder 3 so as to leave a surrounding chamber or water-space 7 to keep the explosion-cylinder cool during the operation of its piston 8, said cylinder 6 being so positioned by means of exterior flanges 9 and 10 at its ends, resting on interior flanges 11 and 12 at the ends of the lower cylinder.

The end walls 13 and 13ª of the cylinder 6, the former of which is formed therewith and the other formed with the cylinder 3, are formed with circular angular recesses 14, in which seat complementary oscillatory valve-disks 15 and 15ª, having flanges 16, the central portion of said disks being provided with inlet-ports 17, arranged to be registered with inlet-ports 18 in the end walls of the explosion-cylinder, with exhaust-ports 19, arranged to register with exhaust-ports 20 in the end walls of the explosion-cylinder, and exhaust-ports 21 in the flange 16, arranged to register with exhaust-ports 22 in the end walls of the explosion-cylinder. The free end of the piston-rod 23 of the piston 8 extends through the end wall 13ª, formed with the lower cylinder, and through a sleeve 25 on the valve-disk 15ª, journaled in a bearing 25ª in the head 5, and is connected by an arm 25ᵇ with the piston-rod 26 of the piston 27 of the compression-cylinder, and consequently the operation of the pistons 8 and 27 are concurrent.

Air-inlets 28 and 28ª and gasolene-inlets 29 and 29ª for the compression-cylinder 2 are provided at each end in the end and top walls thereof, respectively, and ports 31 and 32, controlled by valves 33 and 34, respectively, lead from the compression-cylinder into the chambers 35, which are provided with exhaust-ports 35ª.

The shaft 36 for the valve-disk 15 extends through a bearing 37 on the head 4 and is provided with a crank-arm 28ᵇ for operating said shaft and its disk. A similar crank-arm 39 is formed with the sleeve 25 for operating its disk. An igniter *x* is provided at each end of the cylinder 6 to explode the charge as it enters. It will be understood that the operations of the valve-disks are so timed that they will control the inlet and exhaust ports in the manner described in the operation of the machine. The cams 28ᵇ and 39 are pivotally connected to the ends of rods 50, and the other ends of said rods engage cams 51 on a rotary cam-shaft 52, and thereby give oscillatory movement to the disks 15 and 15ª, said rotary shaft receiving motion from the piston 23 by a crank-shaft 53, the crank of which is connected to the piston-rod 23 by a rod 54, and a miter-gear 55 on said crank-shaft meshes with a miter-gear 56 on the cam-shaft 52.

The operation is as follows: Air is sucked into the compression-cylinder through the inlet-port 28 by the movement of the piston 27 to the right and atomizes the gasolene, which is fed into said cylinder at the same time through the inlet-port 29, forming a gas, which on the return stroke of the piston is compressed in said cylinder until the piston has traveled about three-quarters of its stroke, at which time the valve 33 will uncover the port 31, and the exhaust-port 22 in the walls

13 of the lower cylinder will be closed by the partial rotation of the disk 15 bringing a portion of the flange across said port. The gas will then enter the chamber 35 at the left of the explosion-cylinder and be retained therein until the piston has completed its stroke, and upon the continued rotation of the disk 15 the exhaust-port 35ª at the left of the explosion-cylinder will be closed by a portion of the valve-disk 15 covering it and the inlet-port 18 at the left of the explosion-cylinder opened by the port 17 registering therewith. Gas will then pass from the chamber 35 into the left-hand end of the explosion-cylinder and be exploded by the igniter *x*. At the same time the ports 18 at the left of the explosion-cylinder are opened, the corresponding ports at the right of the explosion-cylinder are closed, and the exhaust-ports 22 and 20 are opened by the rotation of the valve-disk 15ª and the registration of the exhaust-ports 21 and 19, respectively, therewith, thus allowing the spent gas to exhaust from the chamber 35 and explosion-cylinder 6 at the right of the explosion-cylinder. On the return stroke of the piston the results which take place at the right-hand end of the compression-cylinder and those at the left-hand end are reversed. Thus it will be seen that as explosions occur alternately at each end of the cylinder 6 two impulses are given to the crank-shafts during each revolution.

I do not desire to be understood as limiting myself to the details of construction and arrangement as herein described and illustrated, as it is manifest that variations and modifications may be made in the features of construction and arrangement in the adaptation of the device to various conditions of use without departing from the spirit and scope of my invention and improvements. I therefore reserve the right to all such variation and modification as properly fall within the scope of my invention and the terms of the following claims.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston therein having a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, inlet and exhaust ports at each end of the explosion-cylinder connecting it with said chambers, valves controlling said ports, exhaust-ports connecting said chambers with the ends of the compression-cylinder, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

2. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston therein having a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, walls across the ends of the explosion-cylinder each having inlet and exhaust ports connecting the compression-cylinder with said chambers, disk valves controlling said ports, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

3. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, inlet and exhaust ports at each end of the explosion-cylinder connecting it with said chambers, disk valves controlling said ports, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described,

4. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston therein having a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, walls across the ends of the explosion-cylinder each having a conical end and inlet and exhaust ports connecting the compression-cylinder with said chambers, conical-shaped disk valves turning on the conical end walls of the explosion-cylinder and controlling said ports, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

5. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston therein having a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, walls across the ends of the explosion-cylinder each having a conical end and inlet and exhaust ports connecting the compression-cylinder with said chambers, conical-shaped disk valves turning on the conical end walls and controlling said ports, shafts connected to said valves, means for operating said shafts, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

6. A gas-engine comprising a compression-

cylinder having air and fluid inlets at each end, a piston therein having a piston-rod, an explosion-cylinder, a piston therein having a piston-rod, a rigid connection between said piston-rods, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, walls across the ends of the explosion-cylinder each having a conical end and inlet and exhaust ports connecting the compression-cylinder with said chambers, conical-shaped disk valves having inlet and exhaust ports controlling the ports from said chambers to the explosion-cylinder, shafts connected to said valves, means for operating said shafts, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

7. A gas-engine comprising a compression-cylinder having air and fluid inlets at each end, a piston therein having a piston-rod an explosion-cylinder, a piston therein having a pitman-rod, a rigid connection between said piston-rods, a water-chamber encircling said explosion-cylinder and separating it from the compression-cylinder, a chamber at each end of the explosion-cylinder having an exhaust-port to the outer air, inlet and exhaust ports at each end of explosion-cylinder connecting it with said chambers, disk valves controlling said ports, exhaust-ports connecting the ends of the compression-cylinder with said chambers, valves controlling said ports and an igniter at each end of the explosion-cylinder, substantially as described.

In testimony whereof I have signed my name in the presence of the subscribing witnesses.

NORMAN WESLEY TRAVISS.

Witnesses:

A. L. MILLER,

ROBERT STROEHAN.