(No Model.)

2 Sheets—Sheet 1.

G. W. ROTH.

GAS OR GASOLINE ENGINE.

No. 539,923. Patented May 28, 1895.

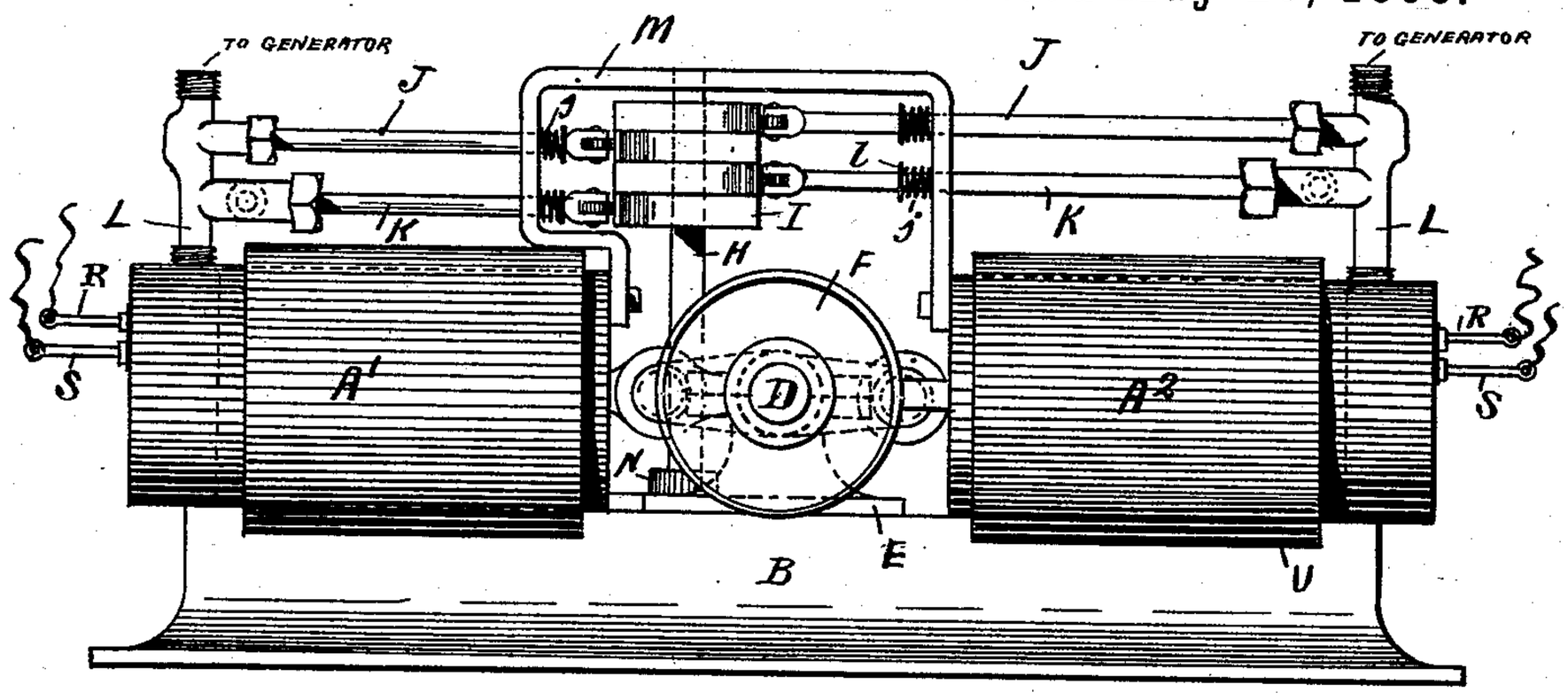

Fig 1.

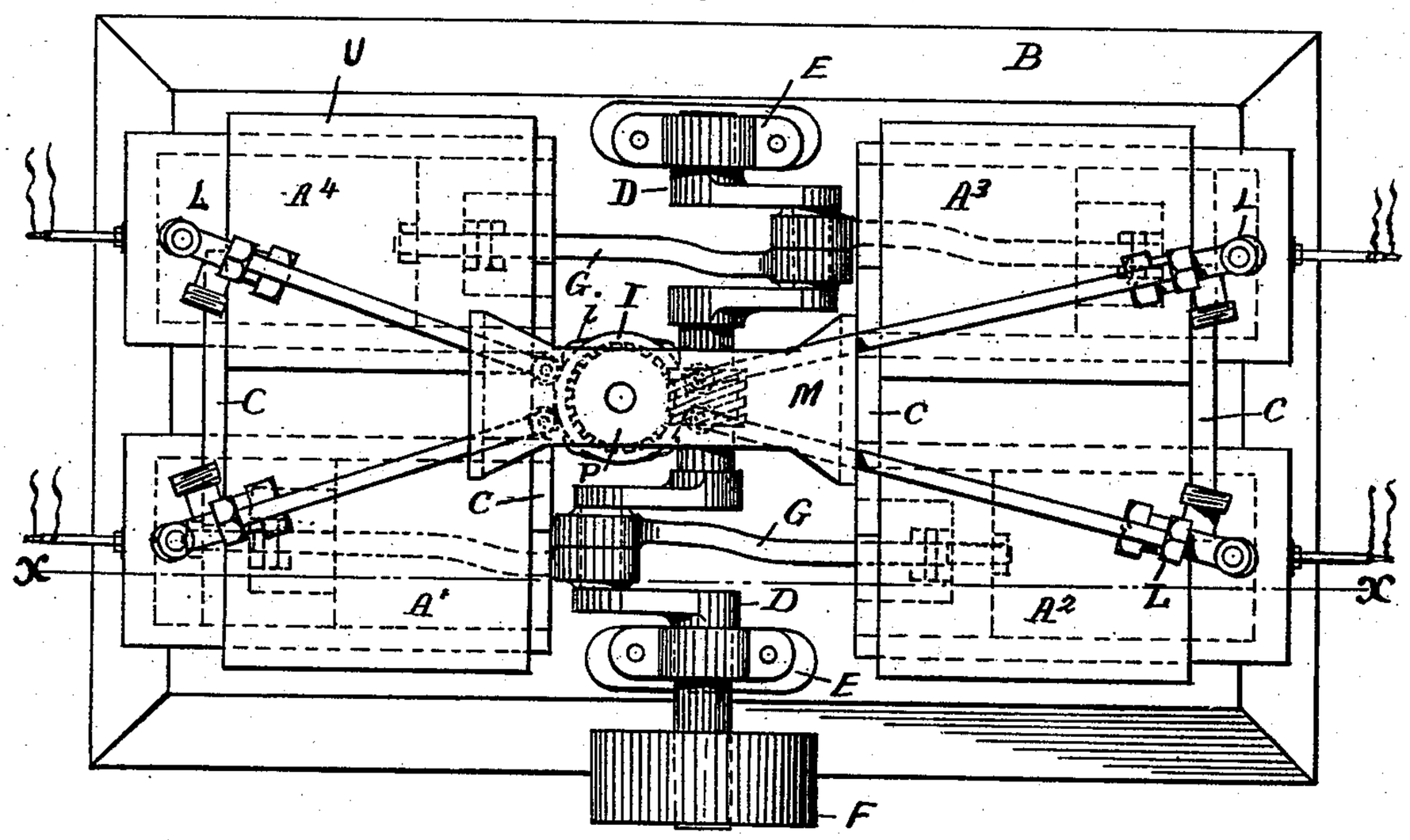

Fig 2.

WITNESSES:

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E. W. Leach

INVENTOR

Gilson W. Roth

BY

Jno. S. Thuman.

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

G. W. ROTH.

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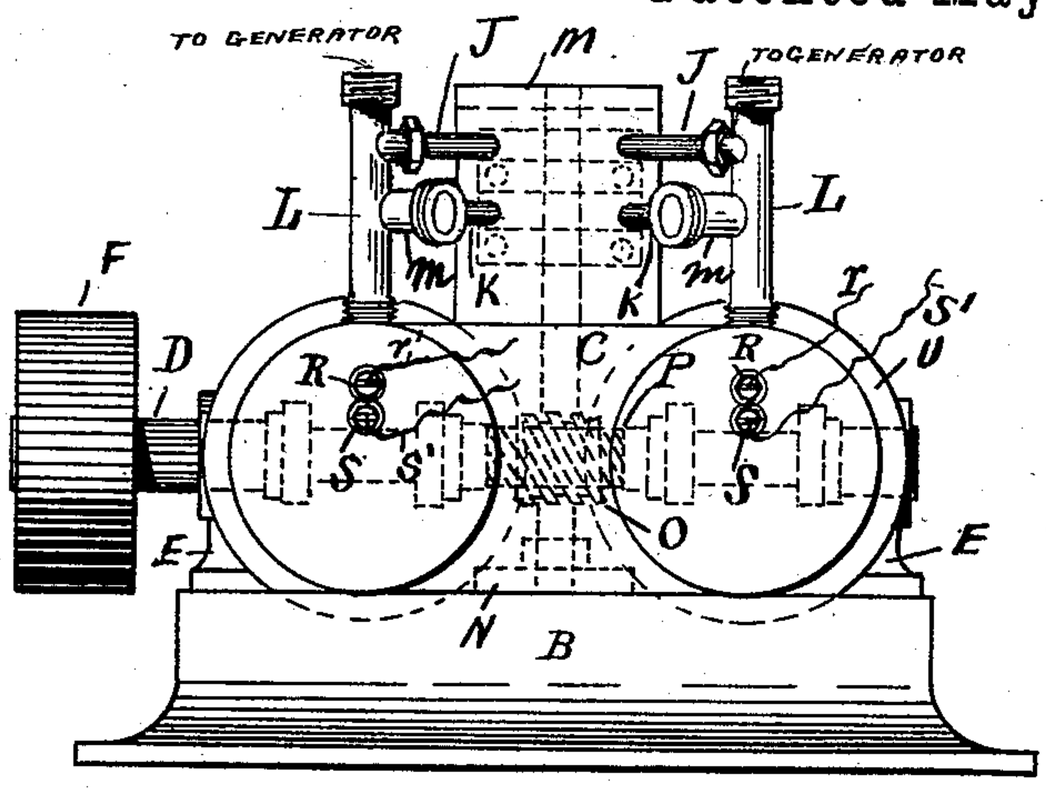


Fig 3.

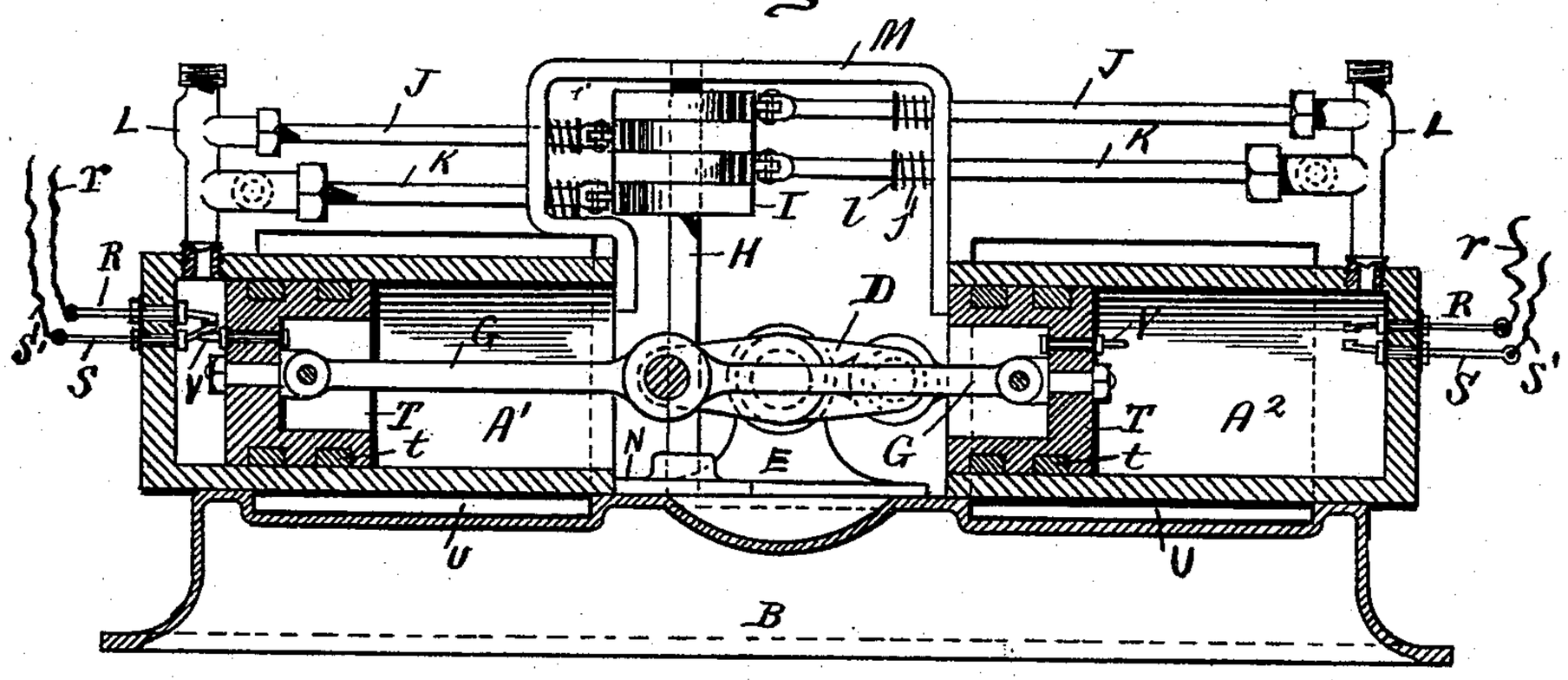
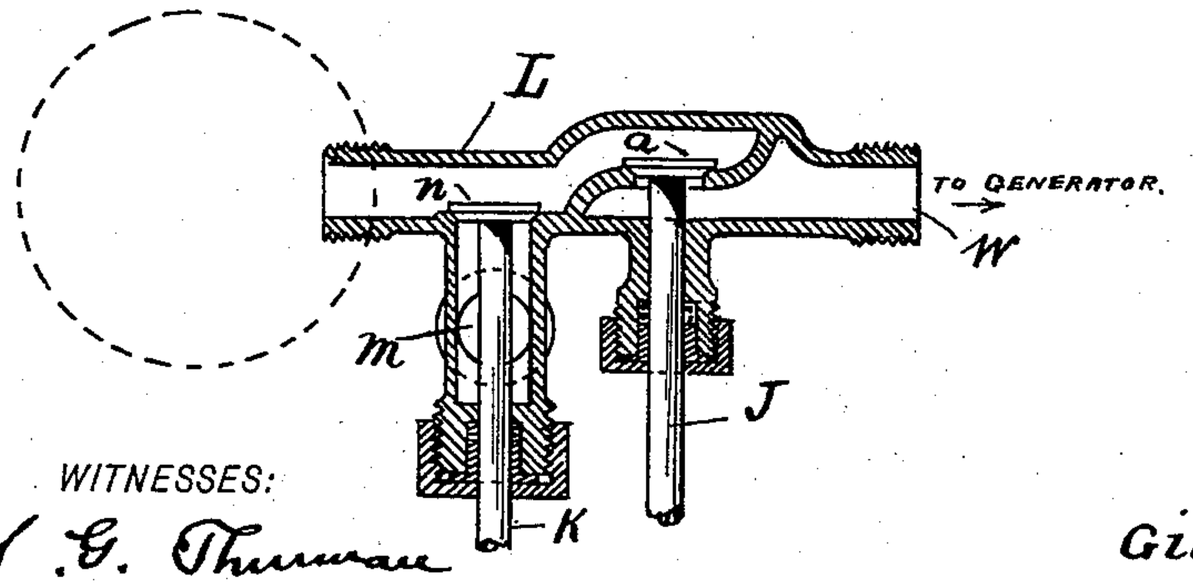


Fig 4.



WITNESSES:

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E. M. Leech

Fig 5.

INVENTOR

Gilson W. Roth

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ATTORNEY.

UNITED STATES PATENT OFFICE.

GILSON W. ROTH, OF RICHARDS, INDIANA.

GAS OR GASOLINE ENGINE.

SPECIFICATION forming part of Letters Patent No. 539,923, dated May 28, 1895.

Application filed June 4, 1894. Serial No. 513,373. (No model.)

To all whom it may concern:

Be it known that I, GILSON W. ROTH, a citizen of the United States, residing at Richards, in the county of Brown and State of Indiana, have invented certain new and useful Improvements in Gas or Gasoline Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of engines in which a mixture of gas or gasoline and air under compression is ignited by an electric spark to operate the piston.

The object of my invention is to provide a gas or gasoline engine with four insulated cylinders, each cylinder producing power at different times at every half revolution of the crank shaft, in order that the engine may not have any dead points and produce more power than the simple gas engines now in use. These objects are accomplished by means of a combined supply and discharge valve connected to cams by means of rods which are operated by spiral gears connected to the main shaft.

A further object is to provide a simple, inexpensive and efficient mechanism for producing an electric spark to effect the ignition of the charge of compressed gas. To this end I provide each of the reciprocating pistons of the engine with an insulated point arranged to be projected beyond the piston. I mount in the head of the combustion chamber a rigid insulated electrode and a second electrode insulated and flexible in such a manner that it will act with yielding pressure upon the second electrode by means of the projecting point which is carried against it by the movements of the piston.

It is obvious that a gas engine of this type without any dead points and receiving power at each half revolution of the shaft, will have more power and will run more uniform and regular than the single cylinder gas engines now commonly in use.

I have aimed to make my invention of few parts and of such simple construction as to make it durable in use and economical to manufacture.

With these objects in view, the invention still further consists in certain novel details of construction and arrangement of parts to be hereinafter more fully described and pointed out in the claims.

Referring to the drawings, Figure 1 represents a side view. Fig. 2 is a plan view. Fig. 3 is an end view. Fig. 4 is a longitudinal sectional view of the engine on the line *x x*, and Fig. 5 is a sectional view of the compound controlling-valve.

A′, A², A³, and A⁴, are the cylinders, and are secured to the bed plate B. I arrange in the cylinders the piston T adapted to be moved back and forth therein, and which is connected to the crank-shaft D, by the rods G, to impart the desired rotation to the same in its movements. The piston T has the spring packing rings *t*. The combustion end of the cylinders is of course, provided with a head or cap preferably made integral therewith, so as to securely inclose it, and confine the explosive material. The crank-shaft D has the bearings E.

The cylinders are connected together by means of the brace plate C, extending to the center of each cylinder. Between these braces and connected thereto is the water space U extending entirely around the cylinders, and have suitable supply and discharge openings for the water.

I arrange the projection V in the piston. Said projection is insulated from the piston by means of asbestos washers and tubing around the projection. Said projection is securely held in place by means of a nut bearing against said non-conducting washers.

I pass through the head of the cylinders the rigid electrode R and the flexible electrode S. Both of said electrodes are insulated from the cylinder, and extend into the cylinder far enough for the projection on the piston to come in contact therewith as the piston reaches its extreme advanced position. The ends of said electrode that extend into the cylinder have platinum points, so that when the point of the projection on the piston is in its extreme advanced position it will press the flexible electrode against the rigid elec-

trode and cause a spark to ignite the explosive material, and will retreat when the piston returns. I arrange an electric battery, or a series of batteries in suitable positions and carry the wires *r* and S′ from its poles to the electrodes. It will be understood that the cylinder and piston are insulated and are not in the circuit.

L is a casing containing the supply and exhaust valves which communicate with the combustion end of the cylinders and has the rods J to operate the supply valve and the rods K to operate the exhaust valve. These valve rods are operated by means of the cams I preferably made separate, so that each rod will be operated independently of the other and are keyed or set screwed to the vertical shaft H. Said shaft has the yoke bracket M at the top and the bearings N at the bottom and is operated by means of the spiral gear wheel P meshing in the spiral worm O. The vertical shaft is intended to make one revolution to two revolutions of the crank-shaft. Each of the cam wheels I has one projection *i* on its periphery to operate the valves.

The ends of the rods bearing against the cams have rollers to avoid friction and wear, and have the tension spiral springs *j*, held in place by means of the washers *l* to automatically close the valves after the projection *i* has passed the roller. The rods J and K pass through and are guided by the bracket M. *a*, is the supply valve and *n* is the exhaust valve. W is the inlet and *m*, is the outlet or exhaust opening. The rods are packed with suitable packing where they enter the valves to prevent the escape of gas.

Referring to Fig. 2 cylinder A′ has compressed the gas end and is ready to fire while cylinder A^2 is full of gas and ready to compress. Cylinder A^3 has no gas, but is ready to receive it as soon as the piston moves, while cylinder A^4 has discharged and is ready to clean the cylinder. In operation, cylinder A′ fires and forces the piston to the opposite end. Cylinder A^2 in the meantime has compressed the gas and is ready to fire and force the piston to the opposite end. Cylinder A^3 has in the meantime received gas and compressed it, and fires and forces the piston to the opposite end. Then cylinder A^4 has by this time compressed the gas and is ready to fire.

It will be manifest to a skilled mechanic that the details of construction may be variously modified within the limits of my invention, without materially changing the mode of action.

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

1. In combination with the series of cylinders, the pistons and piston rods working therein, the inlet and exhaust valves, the horizontal operating rods connected to each of said valves, the vertical shaft between said cylinders and operated by the crank shaft and a series of cams carried by said vertical shaft whereby the rotation of said shaft will rotate all the cams and operate all the valves, substantially as described.

2. In combination with the series of cylinders, the pistons working thereon, the piston rods and the shaft rotated by said piston rods, a vertical shaft located between the cylinders, rotated by the crank shaft, the cams on the upper end of said vertical shaft, the inlet and discharge valves for said cylinders and operating rods for each valve extending into the path of the cams, substantially as described.

3. In combination with the series of cylinders, the pistons working therein, the horizontal shaft rotated by said piston rods, the vertical shaft, the series of cams on said vertical shaft, the casing containing the inlet and discharge valves for said cylinders and the horizontal rods under spring tension connected to each of said valves and operated by the said cams, substantially as described.

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

GILSON W. ROTH.

Witnesses:
JNO. S. THURMAN,
MERRILL MOORE.