(No Model.) 2 Sheets—Sheet 1.

J. FIELDING.

GAS ENGINE.

No. 450,406. Patented Apr. 14, 1891.

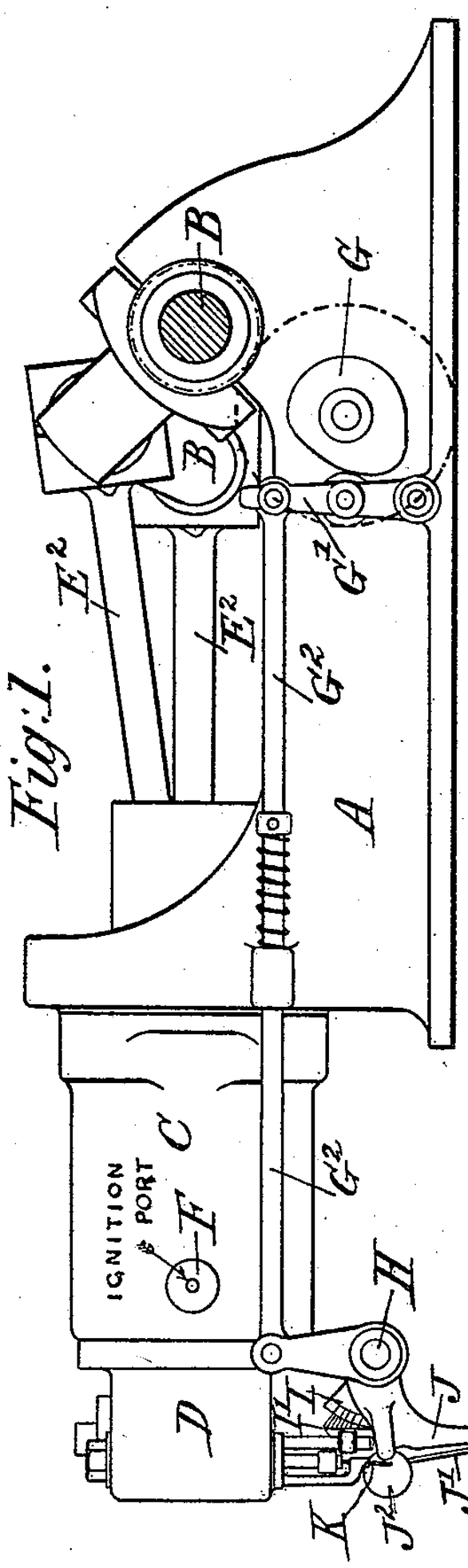

Fig: 1.

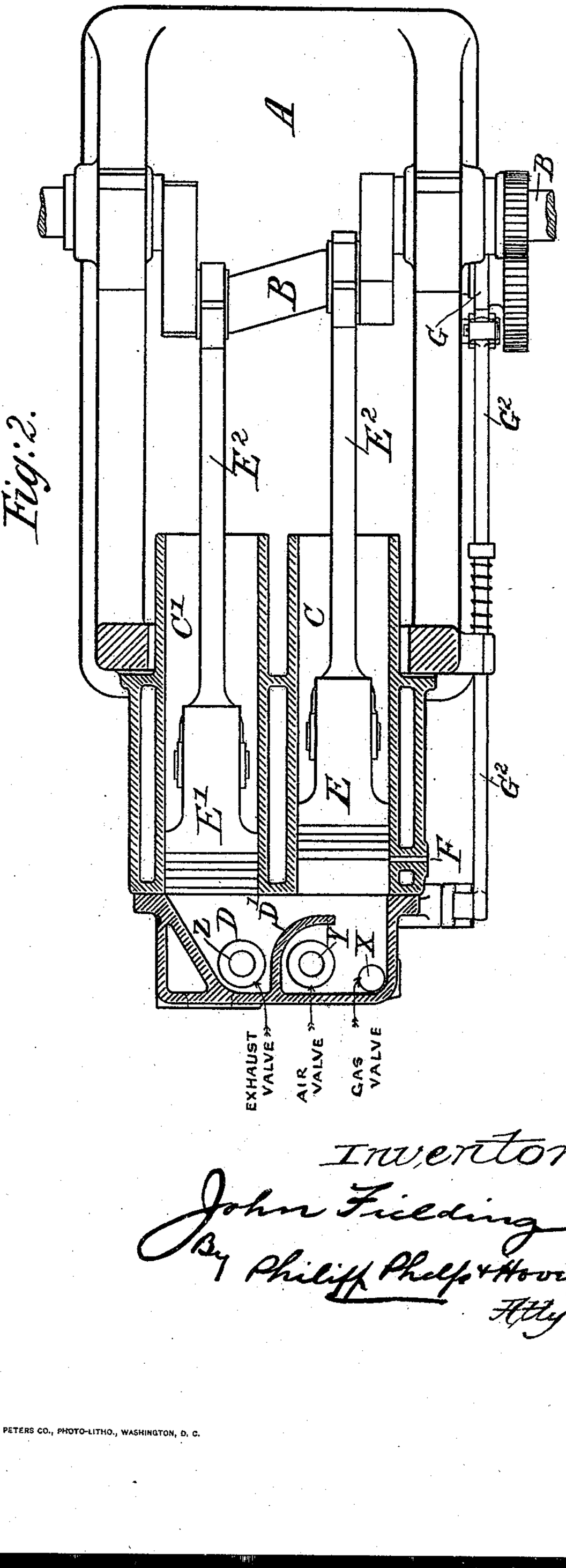

Fig: 2.

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

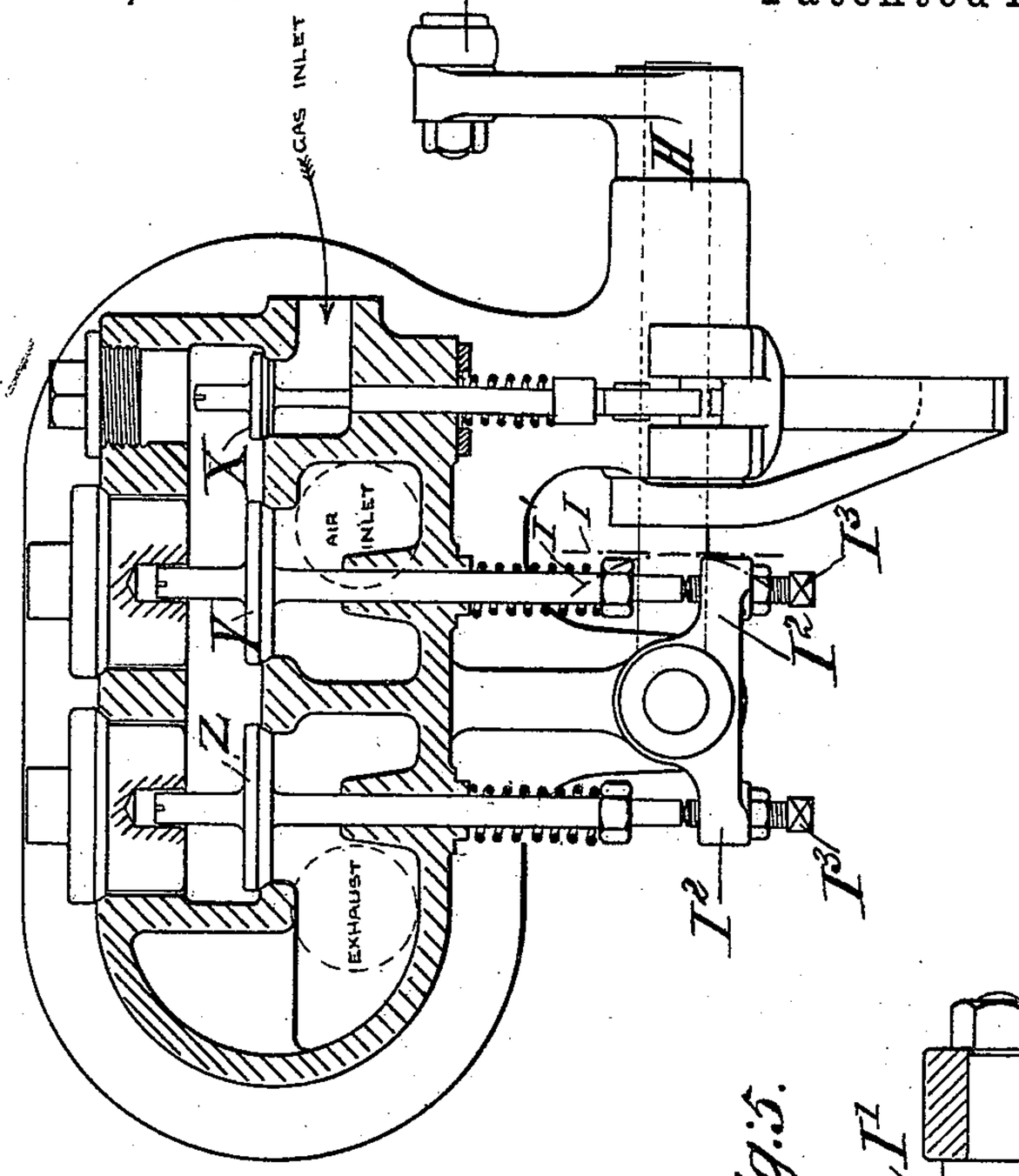


Fig. 5.

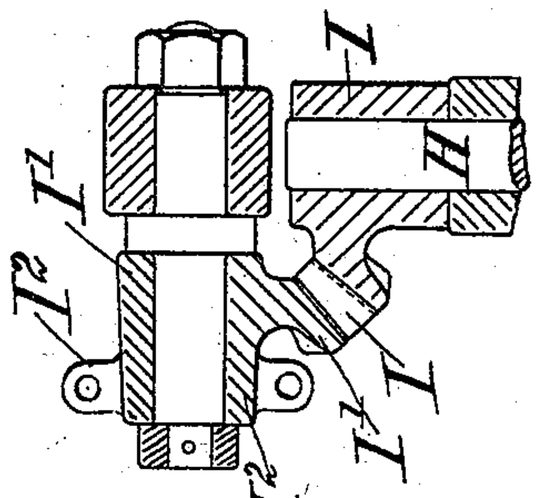
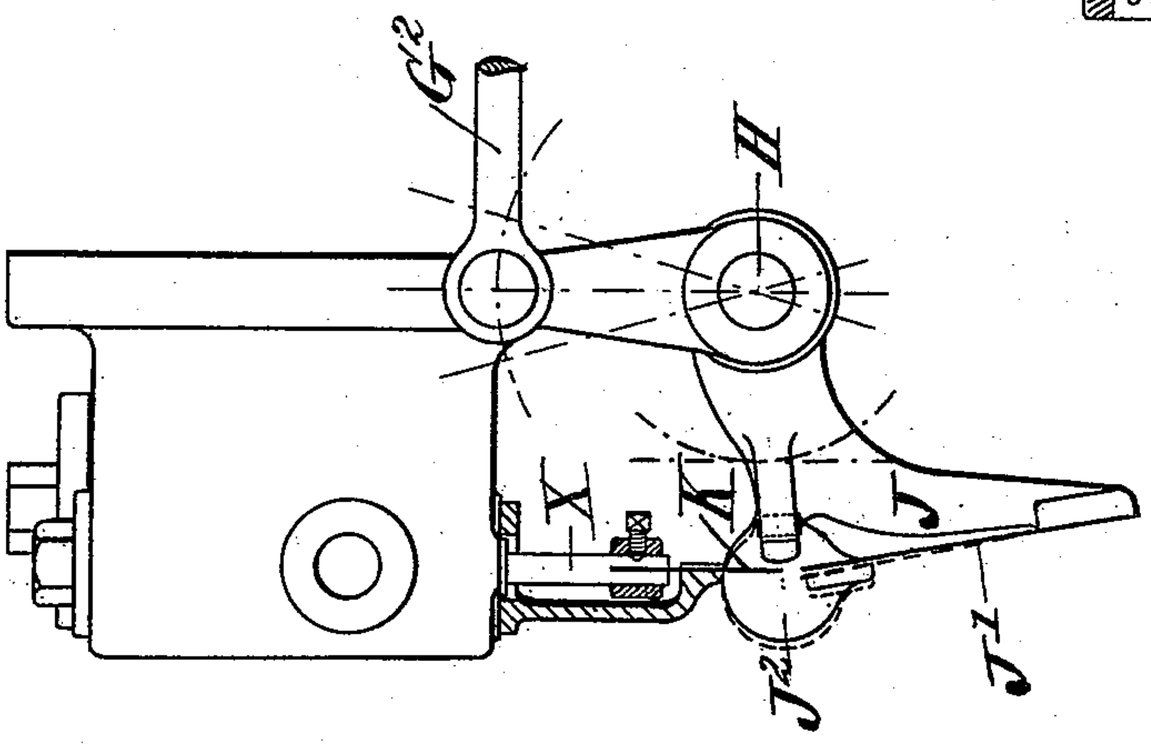


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN FIELDING, OF GLOUCESTER, ENGLAND.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 450,406, dated April 14, 1891.

Application filed July 6, 1889. Serial No. 316,681. (No model.)

To all whom it may concern:

Be it known that I, JOHN FIELDING, of The Atlas Works, in the city and county of Gloucester, England, have invented certain new and useful Improvements in Gas-Motor Engines, of which the following is a specification.

This invention relates to improvements in gas-motor engines giving an impulse once in two rotations of the crank-shaft when working at full power, the charge being drawn in and compressed during one rotation and burned and expelled during the next.

In carrying my invention into practice I employ two pistons working in separate single-acting cylinders, the working ends of which are in free and constant communication with a common combustion-space. The pistons are coupled by connecting-rods to two cranks on the same shaft in such a manner that the movement of one piston will be slightly in advance of the other.

For the purpose of admitting the charge and allowing the escape of the waste products I employ miter-seated valves—viz., one each for the admission of gas and air and a third for the outlet of waste products—which valves are in communication with the combustion-space and are worked by suitable levers operated by a single cam, which is rotated by gearing once for every two revolutions of the crank-shaft.

The igniting apparatus may be of any suitable kind, such as used in gas-motor engines. The governor is attached to an oscillating arm and is caused to act by centrifugal force should the normal speed of oscillation of the arm be exceeded.

In the accompanying drawings, Figure 1 is a side elevation of a gas-engine constructed according to my invention. Fig. 2 is a partial plan view. Fig. 3 is a cross-section on an enlarged scale. Fig. 4 is a side elevation, also enlarged and partly in section, of the valve box and gear; and Fig. 5 is a sectional plan, on an enlarged scale, of a portion of the valve-gear.

A is the main casting of the engine, carrying the bearings for the crank-shaft B and two cylinders C C′, placed side by side.

D is the valve-box placed at the end of the two cylinders, and which forms also an ignition or combustion chamber open to both cylinders C C′.

E E′ are pistons which are connected to the crank-shaft by connecting-rods E^2. The cranks are arranged so that one shall be about forty-five degrees in advance of the other.

In the drawings the piston E′ is shown with the crank on the dead-center, the piston E being in advance, in which position it will just be clear of the ignition-port F.

I have not shown in the drawings an igniting apparatus, as I may use any suitable apparatus of the kind usually employed with gas-motor engines.

The valve-box D contains three miter-valves X Y Z. The valve X is the gas-valve, Y is the air-valve, and Z the exhaust-valve. (See Fig. 3.)

D′ is a vertical curved deflector or partition in the valve-box, the object of which is to direct the entering air toward the gas, so as to obtain a better mixture than would be otherwise obtained.

The valves X Y Z are worked by a cam G, mounted on a stud-axle secured to the main frame A and driven at half-speed by gearing from the crank-axle B. This cam G acts on a pivoted arm G′, which is connected by a rod G^2 with a crank-arm mounted on the outer end of a shaft H, carried by a bracket extending downward from the valve-box D. On the inner end of this shaft H is mounted a toothed sector I, which gears with a similar sector I′, mounted on a stud-axle set at right angles to the shaft H and secured to a bracket extending from the valve-box.

On the boss of the sector I′ are two lugs I^2, against which the rods of the miter-valves Y and Z rest. It will thus be seen that as the shaft H is rocked motion will be communicated to the sector I′ and its lugs I^2, and one or other (as the case may be) of the valves Y Z will be raised, either to admit air or to exhaust. Adjusting-screws I^3 are provided in the lugs to regulate the action of the valves, and the valves are returned to their seats by suitable springs.

The gas-valve X is actuated by a mechanism which I term a "governor," and it consists of a curved arm or lever J, mounted on the shaft H, and to the lower end of which is secured or pivoted a spring blade or arm J'_2,

carrying a weight J^2. This blade J', as the axle H oscillates, comes into contact with a blade K on the end of the valve-rod X so long as the normal speed of oscillation is maintained and raises the valve X to admit gas to the ignition or combustion chamber. Should, however, the speed of the oscillation be unduly increased, the weight will be thrown outward by centrifugal action and the blade J' will miss the blade J^2, and the requisite supply of gas will not be admitted to the combustion-space. When the engine has "slowed" down to its normal speed, the blade J' will then come again into position to act on the valve-rod X.

The action of the engine will be as follows: Let us assume that a combustible charge has been introduced and compressed ready for ignition, and the pistons are in the position shown in the drawings—that is to say, the piston E has uncovered the ignition-port F. The charge will then ignite, and the force of the explosion and the subsequent rapid expansion will drive both pistons forward. On the return-stroke the cylinders will be exhausted. On the next forward stroke gas and air will be drawn in, and on the return-stroke will be compressed ready for ignition as soon as the piston E clears the ignition-port F on its next forward motion. With the two cylinders and the pistons connected with cranks in the manner described and shown the maximum pressure of the ignited charge will act upon the leading crank (piston E) at the most favorable angle to exert a powerful influence on the crank-shaft, while the expansion of the ignited charge takes place at an extremely rapid rate, thus not only tending to reduce the loss of heat by radiation through the cylinder-walls, but also exerting a continuously-powerful influence on the crank-shaft through the second or following crank, (piston E';) also, by reason of the simplicity of the valves and valve-gear an engine of extremely economical construction is obtained.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a gas-motor engine, the combination of two working-cylinders having a common combustion-space, two pistons connected to cranks on a crank-shaft and arranged so that one crank rotates in advance of the other about one-eighth of a rotation, valves for the admission of gas and air, an exhaust-valve, a cam for working all the valves through suitable gearing and driven at half the speed of and from the crank-shaft, and a governor attached to an oscillating arm and caused to act by centrifugal force, all substantially as herein shown and described.

2. In a gas-motor engine, the combination of two working-cylinders having a common combustion-space, two pistons connected to cranks on a shaft and arranged so that one crank rotates in advance of the other about one-eighth of a rotation, and valves suitably actuated for the admission of gas and air and for exhaust purposes, respectively.

3. In a gas-motor engine, the combination, with the gas-valve X, air-valve Y, and exhaust-valve Z, all arranged in one valve-box, of an oscillating shaft H, gearings I I', and rock-arm I^2, transmitting the motion of the shaft H to the valves Y Z, rock-arm J, spring J', and weight J^2 for transmitting the motion of said shaft to the valve X and the cam G, driven by gearing from the crank-shaft of the engine, and connections, substantially such as described, for operating said shaft H from said cam, substantially as described.

4. In a gas-motor engine, the arrangement of governor as shown and described, and consisting of an oscillating shaft suitably driven, a curved arm mounted on the shaft, and a weight carried by a spring-blade attached to the curved arm, as set forth.

5. In a gas-motor engine, the combination, with two motor-cylinders and their pistons, the cylinders being placed side by side, of a valve-box placed opposite the ends of the cylinders and forming a combustion-chamber into which both cylinders open directly over their whole area, whereby the force of the explosion is applied simultaneously and with equal power to the pistons of the two cylinders, substantially as described.

In witness whereof I have hereunto set my hand this 13th day of June, 1889.

JOHN FIELDING.

Witnesses:

H. K. WHITE,

A. W. SPACKMAN.