

No. 681,705.

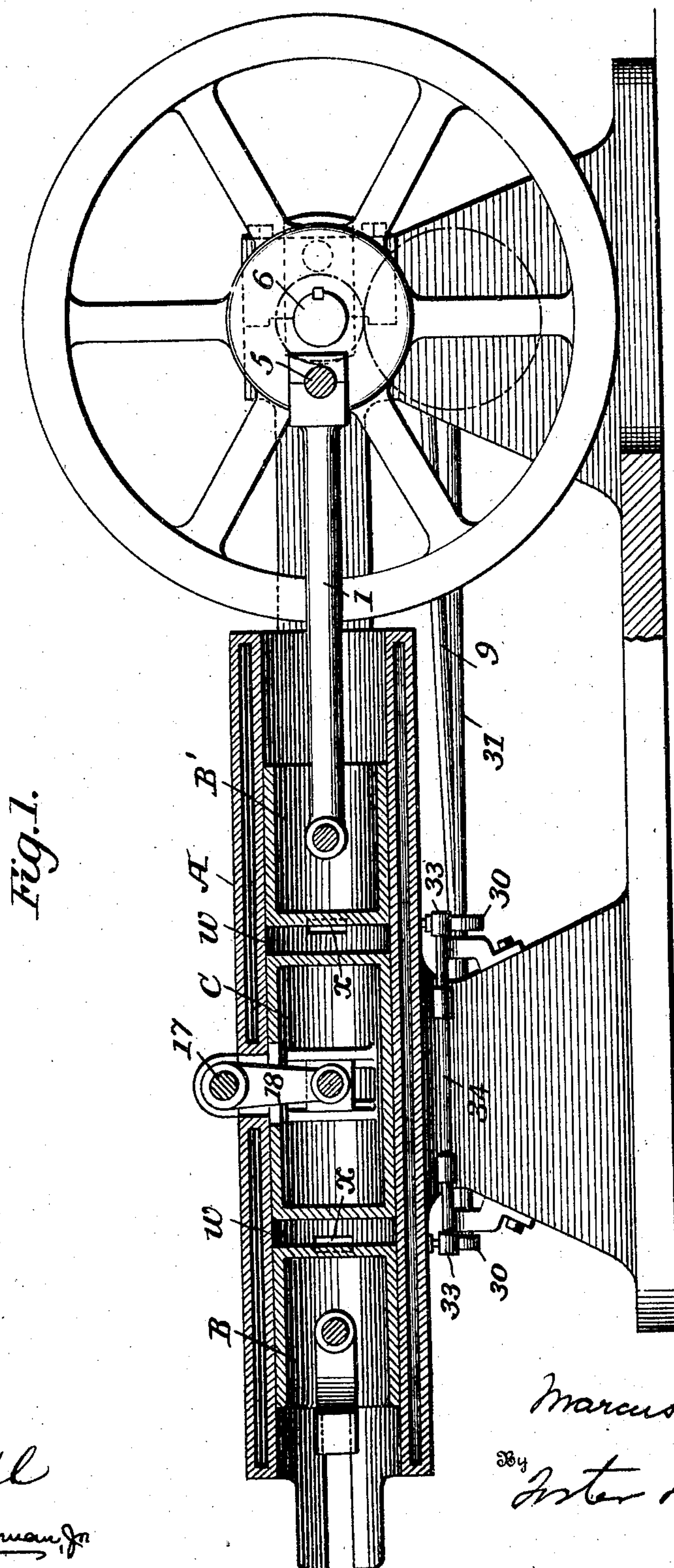
Patented Sept. 3, 1901.

M. W. JAMIESON.
GAS ENGINE.

(Application filed Feb. 18, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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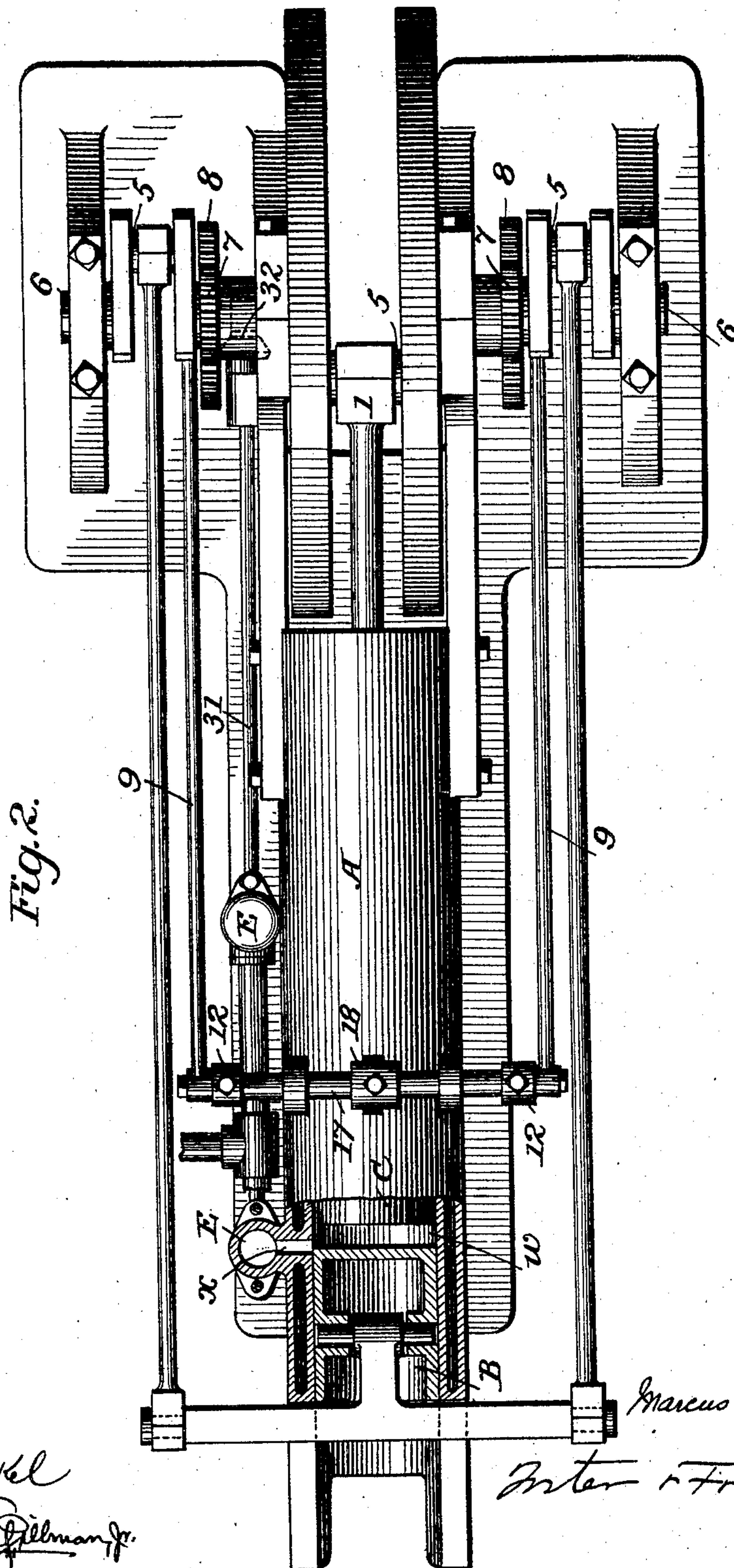
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(Application filed Feb. 16, 1901.)

(No Model.)

4 Sheets—Sheet 2.



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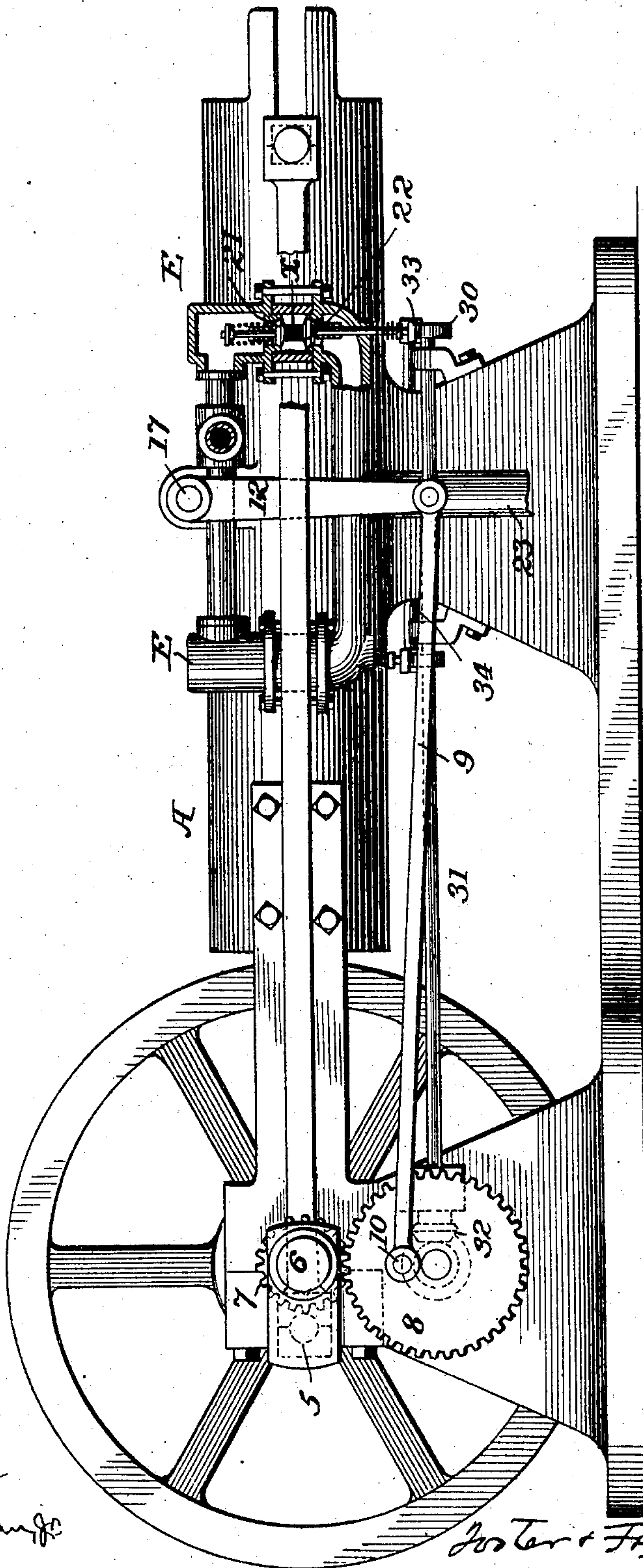
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Fig. 3.



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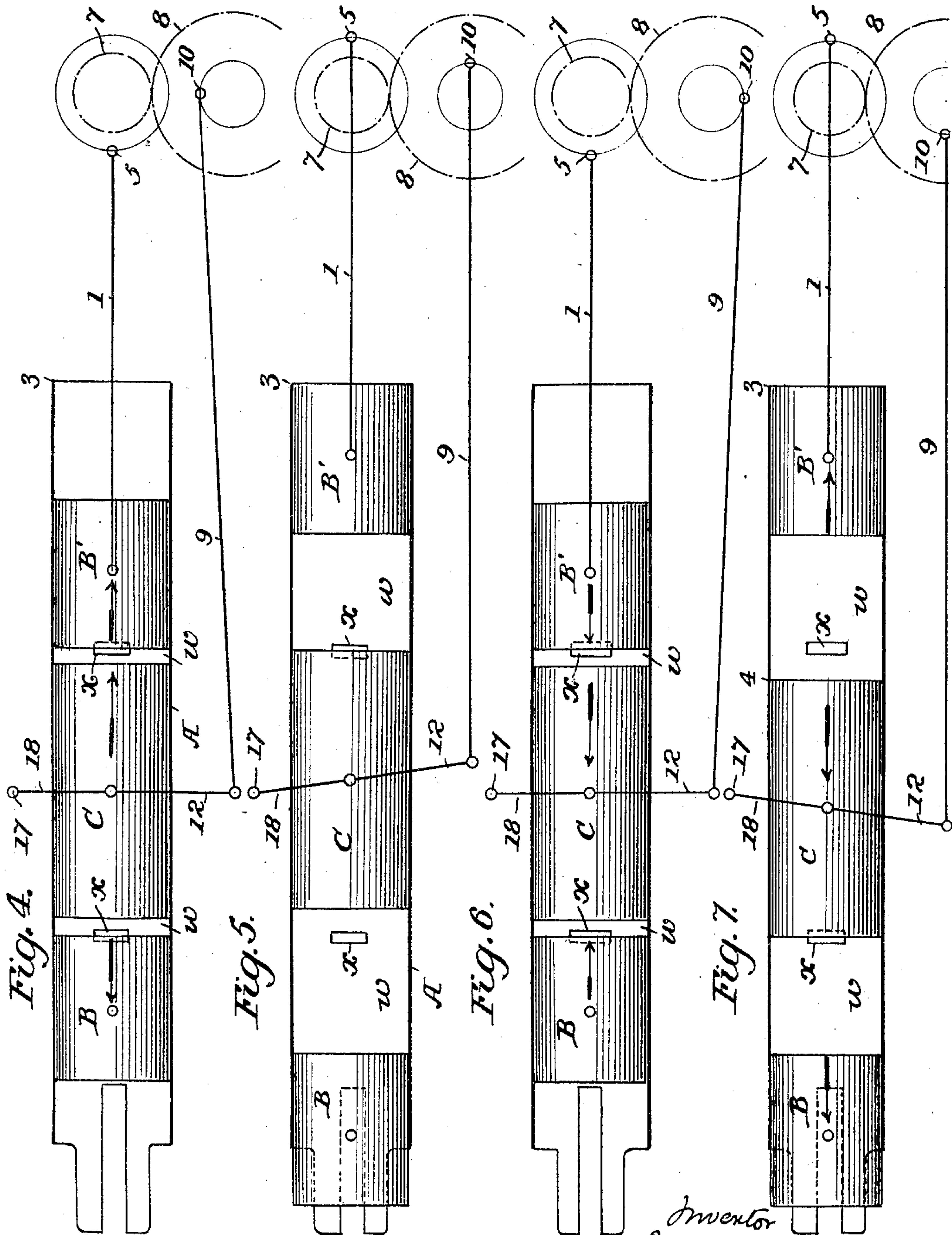
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

MARCUS WILLIAM JAMIESON, OF WARREN, PENNSYLVANIA.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 681,705, dated September 3, 1901.

Application filed February 16, 1901. Serial No. 47,574. (No model.)

To all whom it may concern:

Be it known that I, MARCUS WILLIAM JAMIESON, a citizen of the United States, residing at Warren, in the county of Warren and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to gas-engines, either single-acting or double-acting; and it consists in a gas-engine in which there are a cylinder, one or two pistons, and a plunger, with connections between the parts and a crank-shaft whereby to secure certain improved results, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a gas-engine embodying my improvements. Fig. 2 is a plan view in part section. Fig. 3 is a side elevation looking toward the side provided with the valve-casing, and Figs. 4, 5, 6, and 7 are diagrams showing the operating parts in different positions.

The cylinder A, as shown, is open at the opposite ends and has two pistons B B'; but in some instances, as described hereinafter, where a single-acting engine is desired there may be a single piston B. In the cylinders and between the pistons is an intermediate block or plunger C. The pistons are connected by connecting-rods 1 to the crank-pins 5 of a driving-shaft 6, the cranks in the case of a double-acting engine being oppositely arranged upon the shaft, to which a rotary motion will be imparted from the pistons as the latter are reciprocated under the action of charges introduced and exploded between the inner ends of the pistons and the outer ends of the plunger. In Fig. 1 and Diagram 4 the parts are shown in the position which they occupy prior to the introduction of a charge and while the latter is flowing into the space *w* between one end of the plunger and the opposite piston B'. As the piston B' moves outward the charge continues to flow until the piston reaches the limit of its outward movement at the point 3, Diagrams 4 and 5, the plunger also moving slightly in the direction of the movement of the piston to the position in Diagram 5, but not sufficiently to close the port *x*. As the piston B' reverses its movement the plunger C is carried in the direction of its arrow, Diagram 6, to a slight

extent until in its mid-position, when the charge will be compressed within the space *w* between the ends of the plunger and piston. The explosion takes place at the moment of the greatest compression, and as the piston B' then moves outward the plunger C moves in the opposite direction, Diagram 7, so that as the end of the piston reaches the point 3 the end of the plunger will reach the point 4, thereby prolonging the period of expansion, affording an increased length of time for the gases to act against the piston. On the further rotation of the crank-shaft the piston B' moves inward and the plunger C gradually moves outward until the gases are nearly but not quite expelled, a portion remaining in the intermediate chamber *w*, so as to serve to aid in heating the fresh charge, which is then introduced. The port *x* may serve as an inlet-port for the fresh charges, as well as an outlet-port for the spent gases, as hereinafter described. The action in a double-acting engine between the other piston B and the plunger C is the same as that between the piston B' and the plunger C, except that when the piston B' is moving outward to draw in the fresh charge the piston B is moving outward and the plunger C is moving in the opposite direction under the explosive action, while the piston B moves outward to draw in the fresh charge at the time the piston B' is moving outward and the plunger C is moving in the opposite direction under the action of the explosion. The mixture of air and gas is admitted to the port *x* in the case of a single-acting engine or to each port *x* in the case of a double-acting engine from a valve chamber or casing E, having a spring-actuated valve 21, closing the inlet-port, and the exhaust passes outward to an exhaust-pipe 23 through a port closed by a spring-closed valve 22. The valve or valves 21 open inward under the exhausting action of the piston; but the valves 22 are lifted positively by means of cams 30 on a shaft 31, driven by gearing 32 from the crank-shaft, said cams bearing on arms 33, extending from a rock-shaft 34 between the cams and valve-stems. A rock-shaft 17 is provided with an arm 18, extending through an opening in the cylinder between bearings in the plunger C, and an arm 12 on the rock-shaft is connected

by a rod 9 to a crank-pin 10 on a gear 8, driven from a pinion 7 on the crank-shaft 6. In order that the parts may operate properly, as above described, the crank-shaft 6 has the crank connected with the piston to be operated by the explosion upon its dead-center, while the wrist-pin 10 will be in its mid-position between dead-centers, and consequently the force of the explosion acts both upon the parts connected with the piston and the plunger in a manner tending to rotate the crank-shaft.

I do not here claim the combination of the cylinder, piston, plunger, and the crank-shaft and intermediate parts and arrangement of valve and valve-actuating means either in a single or double acting engine, nor the combination of the cylinder, two pistons, and intermediate plunger and means for compressing, exploding, and discharging the gases on opposite sides of the plunger alternately, as these features constitute the subject of a separate application for Letters Patent, Serial No. 18,606 of 1900.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination in a gas-engine, of a cylinder provided with a port x , a plunger and a piston moving within the cylinder to and from said port, but without either passing beyond the port, and connections whereby on taking in a charge both the plunger and the piston move in the same direction but at different speeds, substantially as set forth.

2. The combination in a gas-engine, of a cylinder provided with a port x , a piston and a plunger moving to and from said port, but without either passing beyond the port and connections whereby the direction of movement of the plunger under the explosion of the charge is opposite to the direction of travel of the piston, and the direction of travel of the

plunger during compression is the same as that of the piston, while both the plunger and piston move in the same direction in taking in the charge but at different speeds, substantially as set forth.

3. The combination in a gas-engine, of a cylinder provided with a port x , a piston moving in the cylinder to and from said port, a plunger moving in the cylinder to and from the piston but without closing said port, and connections whereby both the plunger and piston in taking in a charge move in the same direction at different speeds and in expelling the charge move toward each other but without meeting leaving a space for a retention of a portion of the gases, substantially as set forth.

4. A gas-engine provided with a cylinder, pistons, intermediate plunger and ports x , and means whereby to move each piston and the plunger in the same direction but at different speeds in taking in the charge, substantially as set forth.

5. The combination in a gas-engine, of a cylinder provided with two ports x , pistons, an intermediate plunger and connections whereby the direction of movement of the plunger under the explosion of a charge is opposite to the direction of travel of the piston moving under said charge, while the direction of travel of each plunger during compression is the same as that of the piston, while both the plunger and the piston move in the same direction but at different speeds in taking in the charge, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARCUS WILLIAM JAMIESON.

Witnesses:

CHARLES E. FOSTER,
W. CLARENCE DUVALL.