(No Model.) 2 Sheets—Sheet 1.

F. KONLEY & C. J. MACOMBER.

ENGINE GOVERNOR.

No. 591,341. Patented Oct. 5, 1897.

Fig. 1.

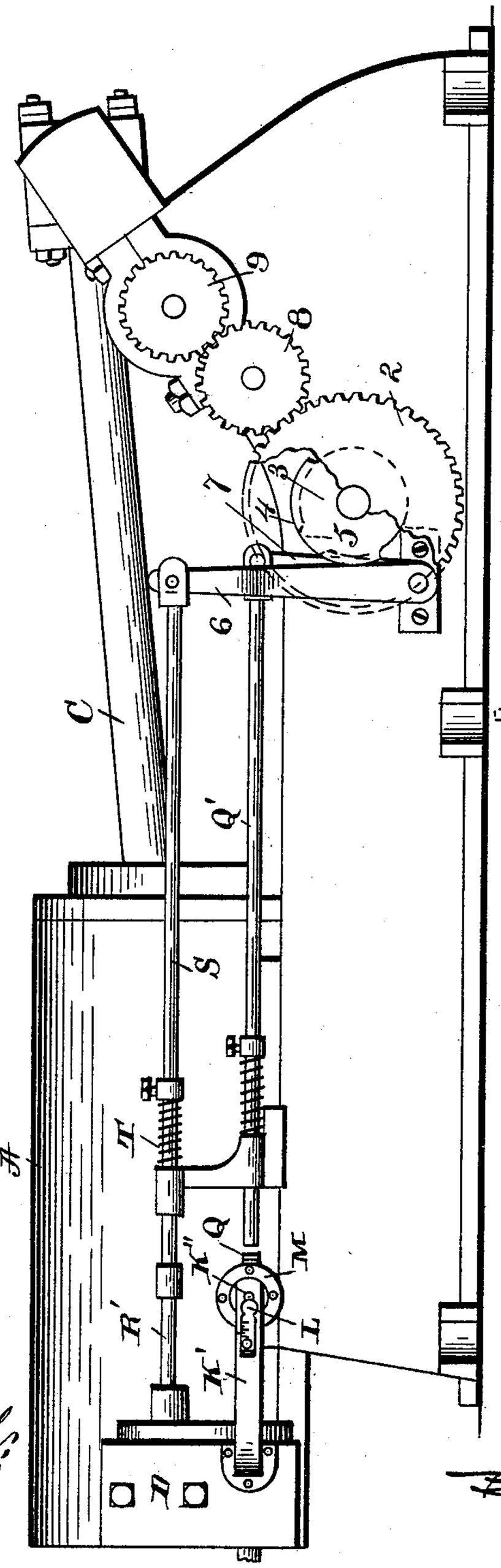
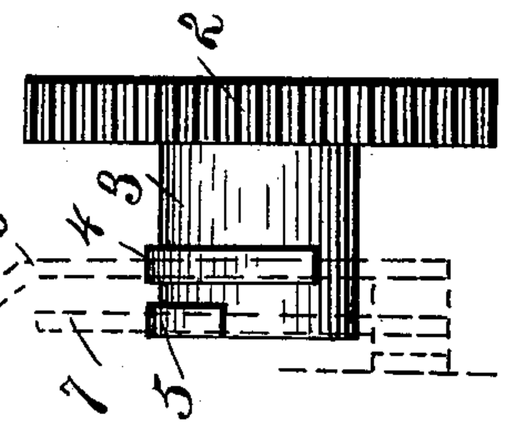


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

F. KONLEY & C. J. MACOMBER.

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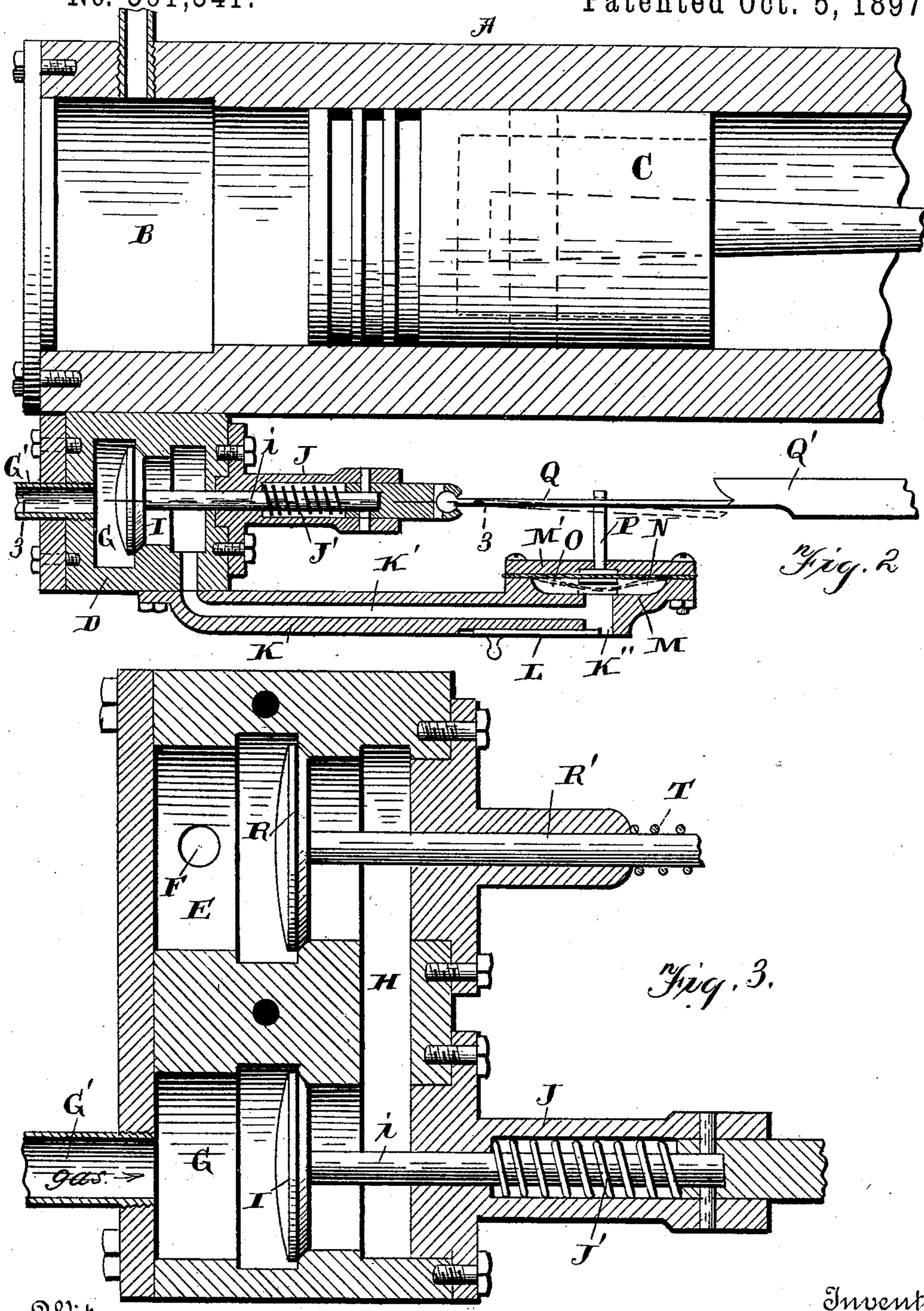

Fig. 2

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANK KONLEY AND CHARLES JOHN MACOMBER, OF ST. MARY'S, OHIO.

ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 591,341, dated October 5, 1897.

Application filed February 23, 1897. Serial No. 624,654. (No model.)

To all whom it may concern:

Be it known that we, FRANK KONLEY and CHARLES JOHN MACOMBER, of St. Mary's, in the county of Auglaize and State of Ohio, have invented certain new and useful Improvements in Engine-Governors; and we do hereby 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to engine-governors, and particularly governors more especially adapted for explosive-engines, and is herein shown and described in connection with a four-stroke-cycle gas-motor engine.

The object of the invention is to provide an improved governor for regulating the admission of gas to the mixing and exploding chambers by means of suitably-arranged mechanism operated by atmospheric pressure in conjunction with the partial vacuum formed by the piston in its charging stroke, the mechanism being such that no gas will be admitted to the exploding-chamber when the engine is running above a predetermined speed.

The invention consists in the novel features of construction, and in the assemblage of parts fully described hereinafter and claimed, and illustrated by the accompanying drawings, in which—

Figure 1 is an elevation of an engine provided with the improved governor. Fig. 2 is a sectional plan view of the exploding and mixing chambers and governor. Fig. 3 is a vertical cross-sectional view of the air and gas inlet and mixing chambers, the valves being shown in elevation. Fig. 4 is a detail view of the cam-wheel for actuating the valve-reciprocating rods.

A designates the cylinder, B the exploding-chamber, and C the piston. Secured to the cylinder is chamber D, formed with upper compartment E, which communicates at F with the exploding-chamber, and also formed with lower compartment G, communicating with chamber E through channel H. Gas is supplied to compartment G at G′, and the passage of gas therefrom to channel H and chamber E and the exploding-chamber is controlled by reciprocating valve I, seated in chamber G and having its stem *i* projected outward into barrel J, in which it is acted upon by spring J′, which holds the valve normally on its seat with the gas-supply shut off. Air is admitted directly into channel F through channel K′, formed in elongated chamber K, and port K″ thereof open to the outer air. The admission of air to this port is controlled by slide L on the outer side of chamber K. The outer portion of chamber K is enlarged at M and countersunk to form depression N, over which is arranged flexible diaphragm O, covered by head M′. Fork P is secured centrally to the diaphragm and extends through head M′ and embraces arm Q of a hit-and-miss mechanism extending outward from valve-stem *i*, said arm operating valve I when actuated by reciprocating rod Q′, the diaphragm holding arm Q normally in line with rod Q′, so as to be actuated by each advancing stroke of the latter. Depression N communicates with channel K′, which is opposite port K″.

Reciprocating valve R in compartment E controls the admission of air and mixed air and gas to the exploding-chamber, and extending outward from the valve is stem R′, adapted to be actuated by reciprocating rod S. The valve is held normally closed by spring T, coiled about the stem.

During the compression, working, and discharging strokes of the piston valves I and R are seated or closed, the reciprocations of rods Q′ and S being much slower than the piston and operating to open the valves against their respective springs only at the beginning of and during the charging stroke, the arrangement being such that valve I is open considerably less time than valve R, as the charge should consist of about twelve times more air than gas, the air being supplied directly through port K″. For imparting to the valve-operating rods the desired relative reciprocation gear-wheel 2 is provided, which is actuated from the crank-shaft of the engine, and is formed with hub 3, carrying long cam 4 and short cam 5, the former being adapted to reciprocate rock-arm 6, connected to rod S, and cam 5, adapted to operate arm 7 of rod Q′.

If the engine is heavily loaded or is to run at high speed, slide L is set to admit more air than for a lighter load or lower speed. Valve

R not only remains open longer than valve I, but opens first, as will be understood by observing the relative arrangement of cams 4 and 5, so that at the beginning of the charging stroke air alone is drawn into the explosion-chamber, and if the piston is running too fast port K″ will not be of sufficient capacity to satisfy the suction ensuing, with the result that diaphragm O will yield to atmospheric pressure and draw inward fork P and move arm Q out of line with rod Q′, so that gas-inlet valve I will not be opened and no charge of gas will enter the exploding-chamber. The speed of the piston will at once be reduced, and the partial vacuum in depression N being extinguished diaphragm O will resume its normal position and arm Q will be moved in line with rod Q′ and at the next advancing stroke of the latter the gas-inlet valve will be opened to admit a charge. By means of slide L the capacity of port K″ may be regulated to a nicety, and thus control, in the manner described, the speed of the engine. As long as the speed is too great the diaphragm will hold the hit-and-miss mechanism out of operative position and no gas will be admitted. The action of valve R being positive during the charging stroke, regardless of the speed of the engine, it follows that when the latter is too great or is higher than that at which the engine is set to run the action of the diaphragm will be certain.

The exhaust and exhaust-operating mechanism have not been shown, as they form no part of the invention. Such mechanism as is used may be conveniently operated through the medium of gear 8, interposed between crank-shaft gear 9 and gear 2.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an explosive-engine, the combination of an explosion-chamber, an air-admission valve, a gas-admission valve, controlled actuating mechanism for the gas-valve, and mechanism for opening the air-valve in advance of the gas-valve and for holding said valve open until after the closing of the gas-valve, substantially as shown and described.

2. In an explosive-engine, the combination of a mixing-chamber, a positively-acting air-admission valve, an inlet for said valve adapted to pass a predetermined amount of air, a gas-admission valve, and governing mechanism therefor adapted to be directly actuated by reduction of atmospheric pressure in the air-inlet when the velocity of the piston in its charging stroke is sufficient to draw more air than can pass the controlled inlet, substantially as shown and described.

3. The combination of an engine-cylinder having an unobstructed exhaust, a piston, a mixing-chamber, a positively-acting valve controlling the communication between the chamber and the cylinder, a controlled air-inlet for the mixing-chamber, a normally-closed valve controlling the admission of gas to the mixing-chamber, and mechanism governing the movement of the gas-valve, said mechanism being actuated by a reduction of pressure in the controlled air-inlet of the mixing-chamber, substantially as shown and described.

4. In a governor, a constantly-open air-inlet and a positively-acting charging-valve, in combination with a gas-inlet valve, a hit-and-miss operating mechanism for the gas-valve, and a diaphragm or equivalent device adapted to move the hit-and-miss mechanism out of operative position upon the reduction of atmospheric pressure in the air-inlet, substantially as shown and described.

5. In a governor, a constantly-open air-inlet, a device for regulating the flow of air thereinto, and a positively-acting charging-valve, in combination with a gas-valve, a mechanism for operating the latter, and a diaphragm or equivalent device adapted to move said mechanism out of operative position upon the reduction of atmospheric pressure in the air-inlet, substantially as shown and described.

6. In an explosive-engine, the combination of an exploding-chamber, a positively-acting air-admission valve, elongated air-duct K having controlled ingress-port K″, chamber M adjacent with the duct and communicating therewith, the flexible diaphragm in chamber M, an air-admission valve, operating means therefor, and a hit-and-miss mechanism between the same and the gas-valve and actuated by the diaphragm, substantially as shown and described.

7. The combination with the mixing-chamber, of the channeled air-inlet chamber in communication therewith, said chamber being formed with a depression common to the inlet-channel, the flexible diaphragm arranged over the depression and adapted to control the operating mechanism for the gas-inlet, substantially as shown and described.

8. The combination with the air and gas valve, the gas-valve, rods for operating the valves, a long cam for reciprocating the rod for the air and gas valve, and the short cam for reciprocating the gas-valve, the action of the short cam beginning and terminating during the action of the long cam, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK KONLEY.
CHARLES JOHN MACOMBER.

Witnesses:
ANTHONY CULLITON,
CHARLES L. RIBER.