No. 662,718. Patented Nov. 27, 1900.

O. F. GOOD.

EXPLOSIVE ENGINE.

(Application filed Aug. 25, 1900.)

(No Model.) 2 Sheets—Sheet 1.

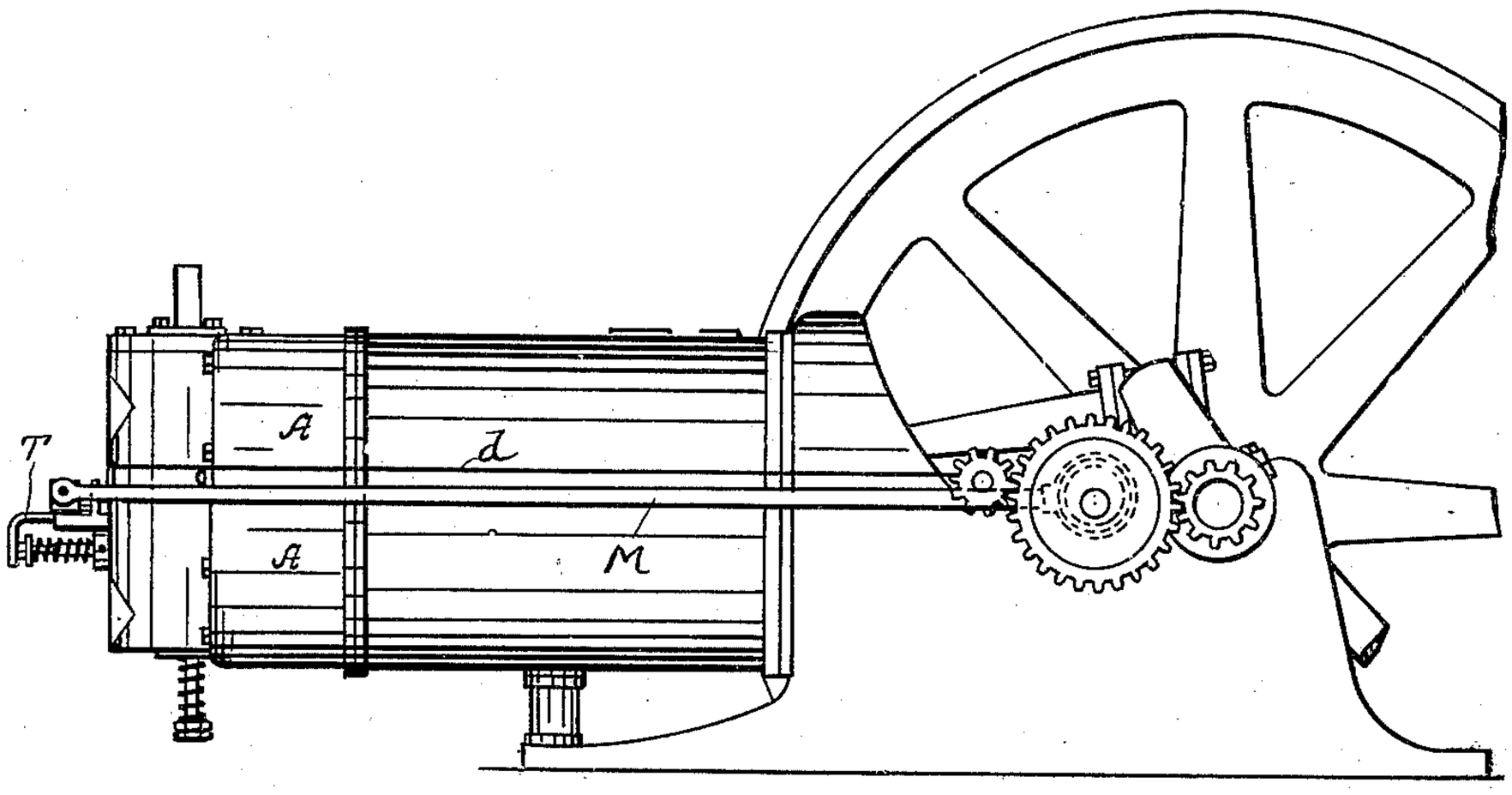

Fig. 1.

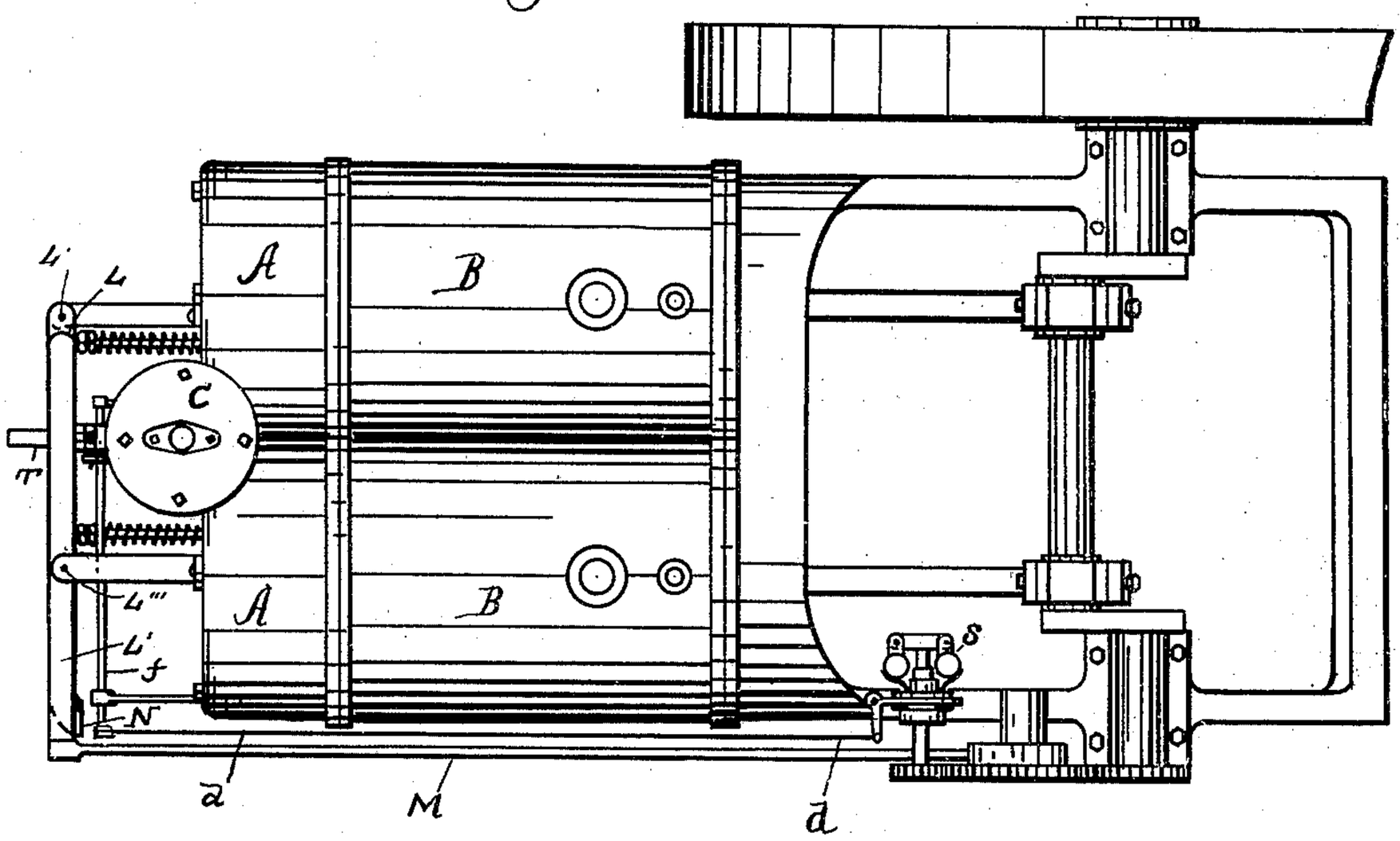

Fig. 2.

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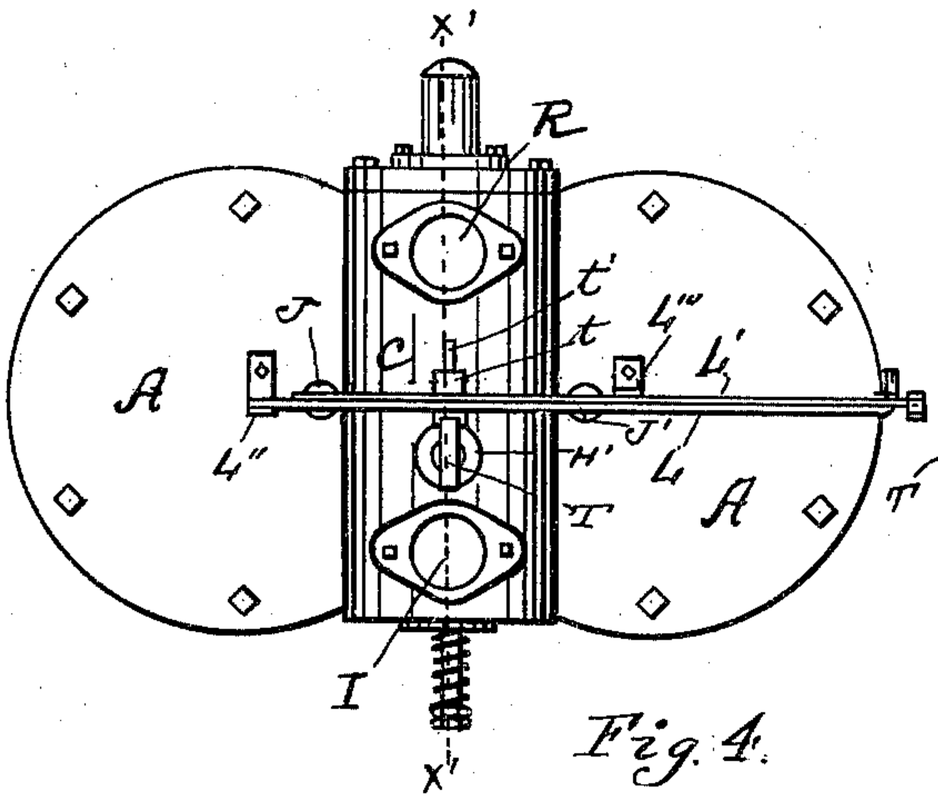

Fig. 4.

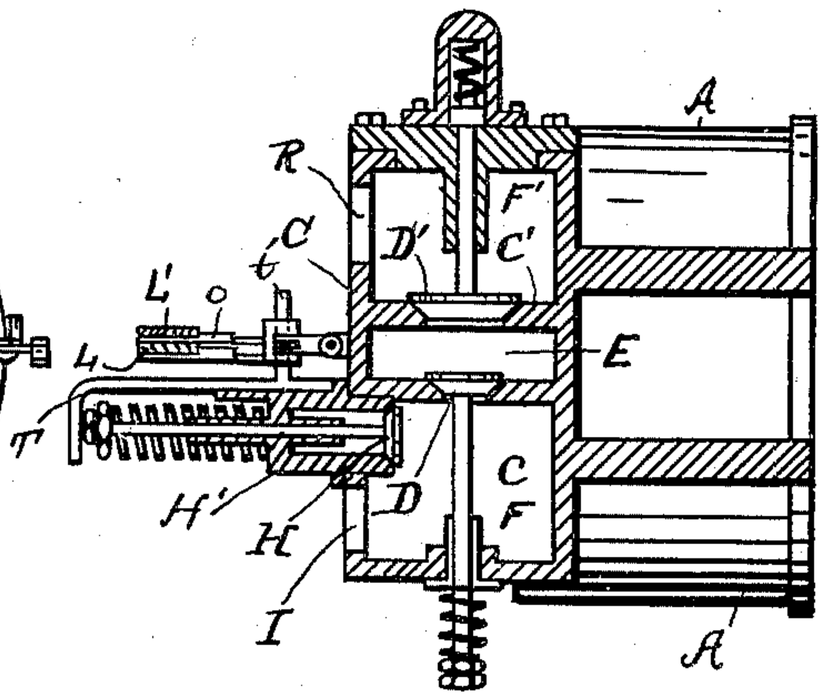

Fig. 5.

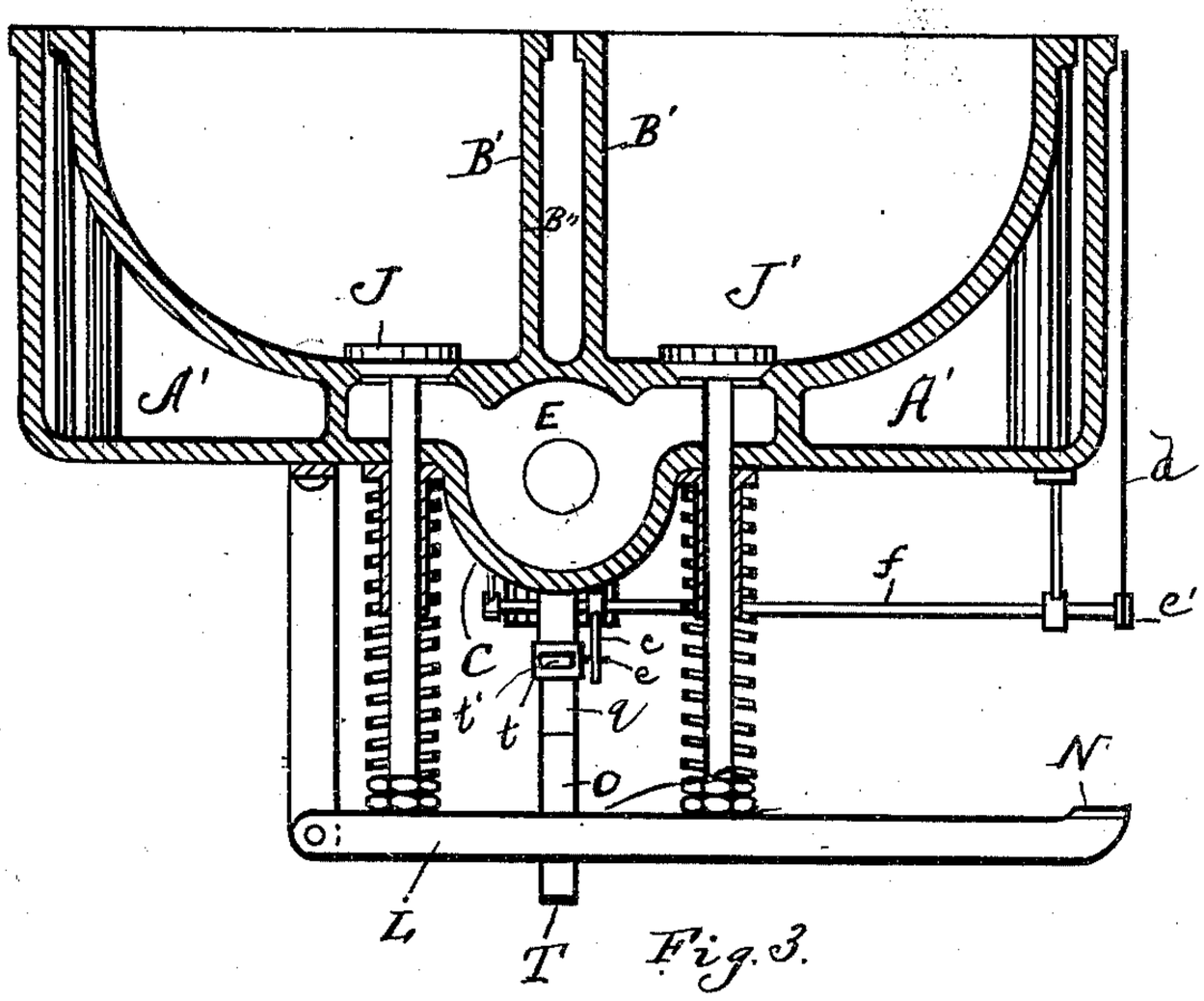

Fig. 3.

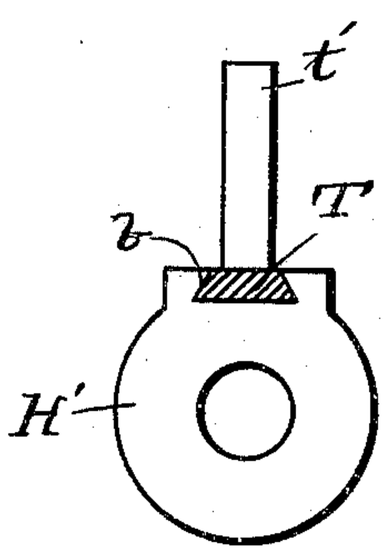

Fig. 7.

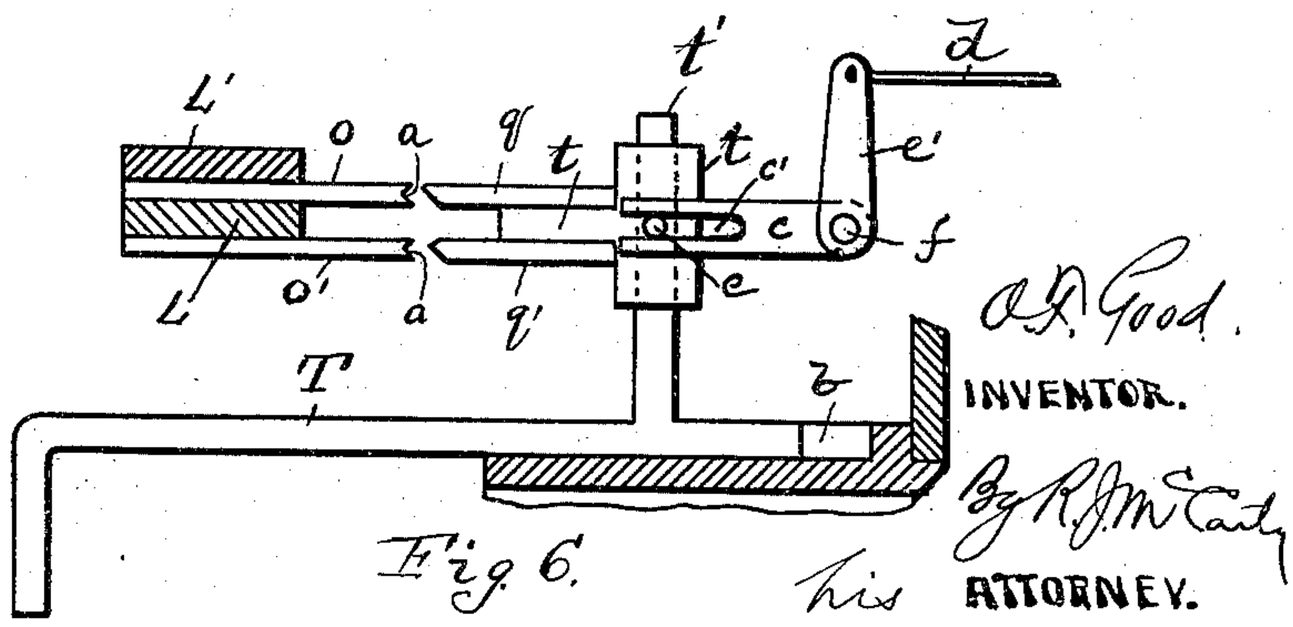

Fig. 6.

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UNITED STATES PATENT OFFICE.

OLIVER F. GOOD, OF DAYTON, OHIO.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 662,718, dated November 27, 1900.

Application filed August 25, 1900. Serial No. 27,965. (No model.)

To all whom it may concern:

Be it known that I, OLIVER F. GOOD, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Explosive-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.

This invention relates to new and useful improvements in explosive-engines, and comprises a double-cylinder engine, the details of which will be hereinafter specified.

The object of the invention is to provide a double-cylinder engine with as few valves as possible, thereby greatly simplifying the engine, making it less liable to be troubled with leakage, and providing altogether a more efficient and reliable engine.

In a detail description of my invention reference is made to the accompanying drawings, of which—

Figure 1 is a side elevation of my improved engine. Fig. 2 is a top plan view. Fig. 3 is a horizontal section through the cylinder-head, as shown in Fig. 4, the section being taken on a line between the two levers L and L′. Fig. 4 is an elevation of the cylinder-head and valve-box. Fig. 5 is a section on the line $x' x'$ of Fig. 4. Fig. 6 is a partial sectional elevation of the devices for regulating the admission of gas to the mixing-chamber. Fig. 7 is an end elevation of the gas-valve box.

In a detail description of my invention similar reference characters indicate corresponding parts.

A A designate the cylinder head or heads, with integral valve-box C and inclosed by water-jackets A′.

B B designate two parallel power-cylinders communicating with the compression-chambers in the head or heads, (see Fig. 3,) which chambers are divided by walls B′ B′, which have a water-space B″. The interior space within the valve-box C is separated into two chambers F and F′, the former being the mixing-chamber and the latter being the exhaust-chamber, said chambers being common to both cylinders. Walls C′ provide seats for check-valves D and D′, valve D being the inlet-valve controlling the admission of the explosive mixture, which consists of air and gas, from chamber F to the compression-chambers, and valve D′ being an exhaust-valve for both cylinders. The admission and exhaust take place through the inlet and exhaust-port E.

R designates an escape-opening from the exhaust-chamber F′.

Gas is admitted to the mixing-chamber F through valve H, and air is admitted to said chamber F through an opening I, having a pipe or other connection. (Not shown.) Chamber F supplies both cylinders through valves J and J′, which open into the compression-chambers in the heads. One of said valves is held open during one revolution of the crank and the other is held open during the next revolution. These valves J and J′ allow an expulsion of the burned gases on every alternate instroke of the pistons and admit fresh air and gas on every alternate outstroke. The said valves control the communication between the port E and the compression-chambers in the heads, port E being common to both valves, as shown in Fig. 3. These valves are operated through levers L and L′, the former being fulcrumed at L″ and lever L′ having its fulcrum at L‴. Lever L′ is connected to an eccentric or cam rod M′. The lever L has a projection N, against which the lever L′ makes contact when the throw of the eccentric is toward the crank. When the eccentric-rod M moves toward the crank-shaft, valve J′ opens through the movement of lever L and valve J opens when the lever L′ is moved by the eccentric-rod M moving away from the crank-shaft. The operation of the valves is reversed on each operation of the levers—that is to say, one valve opens while the other closes. The gas-valve H is operated by the levers L and L′ through tappets O and O′, which are rigidly attached to said levers. These tappets or plates O and O′ have their contact edges provided with grooves a, which engage with tappets or plates q and q', the latter plates being attached to a slide t, which moves on a guide or post t', projected from a slide T. The slide T moves

in a dovetail groove *b* in the side of the valve-box H′ of the gas-valve. The end of the slide T projects at right angles in a position to engage the stem of said gas-valve H. Movement is imparted to the slide T through the levers L and L′ and the tappet-plates O and O′. The said tappet-plates O and O′ engage with the projections or plates *q* and *q′* upon each stroke of the eccentric toward and away from the crank, depending, of course, upon the positions of the plates *q* and *q′*, which are controlled by a governor S. The said plates *q* and *q′* are subject to movement at right angles to the movements of the slide T, and movement is imparted to them through the slide *t* by a bell-crank, one arm *c* of which has a slot *c′*, which receives a stud *e* on a side of the slide *t*, and the other arm *e′* of said bell-crank is connected to the governor-rod *d*. The arms *c* and *e′* are connected by a shaft *f*. When the speed of the engine reaches a certain point above the desired speed, the slide *t* will move to a position that shifts the tappet-plates *q* and *q′* out of a position to be engaged by the tappet-plates O and O′, and no gas will be admitted through the valve H at that time. If the speed of the engine diminishes or the engine for any reason should stop, the governor will cause the slide *t* to drop to a position lower than the plane of the tappets O and O′, and thus the said plates *q* and *q′* will not be within reach of the tappets O and O′. It will be thus seen that there is no danger of the gas-valve remaining open when the engine stops at any point of the stroke.

Having described my invention, I claim—

1. In an explosive-engine, the combination with two power-cylinders, of a head having two separate compression-chambers, an integral valve-box on said head and occupying a position midway of said head, a mixing-chamber, exhaust-chamber, and a passage E between said mixing-chamber and exhaust-chamber, two valves controlling the communication between said mixing-chamber, exhaust-chamber, and passage, an inwardly-opening valve for each compression-chamber in the cylinder-head and controlling the admission of explosive mixture from the passage E to said compression-chambers, and means for operating said valves.

2. In an explosive-engine, the combination with two power-cylinders, of a head having two separate compression-chambers, a valve-box common to both of said compression-chambers and located at a central point on the head, an admission and exhaust passage E in said valve-box common to both of said compression-chambers, a mixture-admission valve opening into each of said compression-chambers and controlling the admission of the explosive mixture and the exhaust of burned gases from and to said passage E, a mixing-chamber F and an exhaust-chamber F′ communicating with said passage E, a gas-valve, and an air-inlet communicating with said chamber F, a lever operating in connection with each of the valves controlling the admission to the compression-chambers, one of said levers adapted to be operated by contact with the other of said levers, and an eccentric or cam rod connected to one of said levers.

3. In an explosive engine, the combination with two power-cylinders, of a head or heads having two separate compression-chambers, a valve-box located on the outer surface of said head or heads at a point midway of the compression-chambers, an admission and exhaust passage in the middle of said box common to both of said compression-chambers, a mixing-chamber F, and an exhaust-chamber F′ common to said admission and exhaust passage, valves controlling the communication between said admission-chamber, exhaust-chamber, and said passage, a gas-admission valve, and an air-inlet communicating with said mixing-chamber, a mixture-admission valve opening into each of the compression-chambers in the heads and controlling the admission of mixture to, and the exhaust of burned gases from said compression-chambers, a lever operating each of said mixture-admission valves, a projection on one of said levers adapted to be engaged by the other of said levers in the movement of said other lever, an eccentric or cam rod connected to one of said levers by which, movement is imparted to said levers, tappets projecting from said levers, and governor-controlled tappets adapted to be actuated by said first-named tappets to open the gas-valve for the admission of gas to the mixing-chamber, substantially as described.

4. In an explosive-engine, the combination with two power-cylinders, of a head or heads having two separate compression-chambers which communicate with said power-cylinders, a valve-box located on said head, a combined mixture-admission and exhaust pasage E in said box which is common to both of said compression-chambers, a mixing-chamber and an exhaust-chamber communicating with said passage E, valves controlling the communication between said chambers and passage, a gas-valve and an air-inlet communicating with the mixing-chamber, a mixture-admission valve opening into each of the compression-chambers in the heads and controlling the communication between said compression-chambers and the common passage E, a lever adapted to actuate each of said mixture-admission valves, one of said levers receiving its movement from the other of said levers, an eccentric-rod connected to one of said levers by means of which primary movement is imparted to said levers, a slide adapted to actuate the gas-admission valve, and tappets under the control of the levers and the governor respectively, by means of which said gas-valve is opened at predetermined times for the admission of gas to the mixing-chamber.

5. In an explosive-engine, the combination

with two power-cylinders, of a head having two separate compression-chambers therein, communicating with said power-cylinders, a valve-box located in the center of said head, an admission and exhaust passage E common to both of said compression-chambers, a mixing-chamber, and an exhaust-chamber communicating with said passage E, valves controlling the communication between said chambers and passage, a gas-admission valve and an air-inlet communicating with the mixing-chamber, valves J and J′ opening into the compression-chambers and controlling the communication between said chambers and the passage E, levers adapted to alternately open said valves J and J′, a connection between said levers and the eccentric, tappets O and O′ on said levers, governor-controlled tappets adapted to be engaged by said tappets O and O′, and a slide T controlled by said governor and adapted to be actuated to open the gas-valve through contact of the tappets O and O′ with the governor-controlled tappets, substantially as shown and described.

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

OLIVER F. GOOD.

Witnesses:

R. J. McCARTY,

C. THEOBALD.