(No Model.) 4 Sheets—Sheet 1.

H. A. WINTER.

GAS ENGINE.

No. 569,530. Patented Oct. 13, 1896.

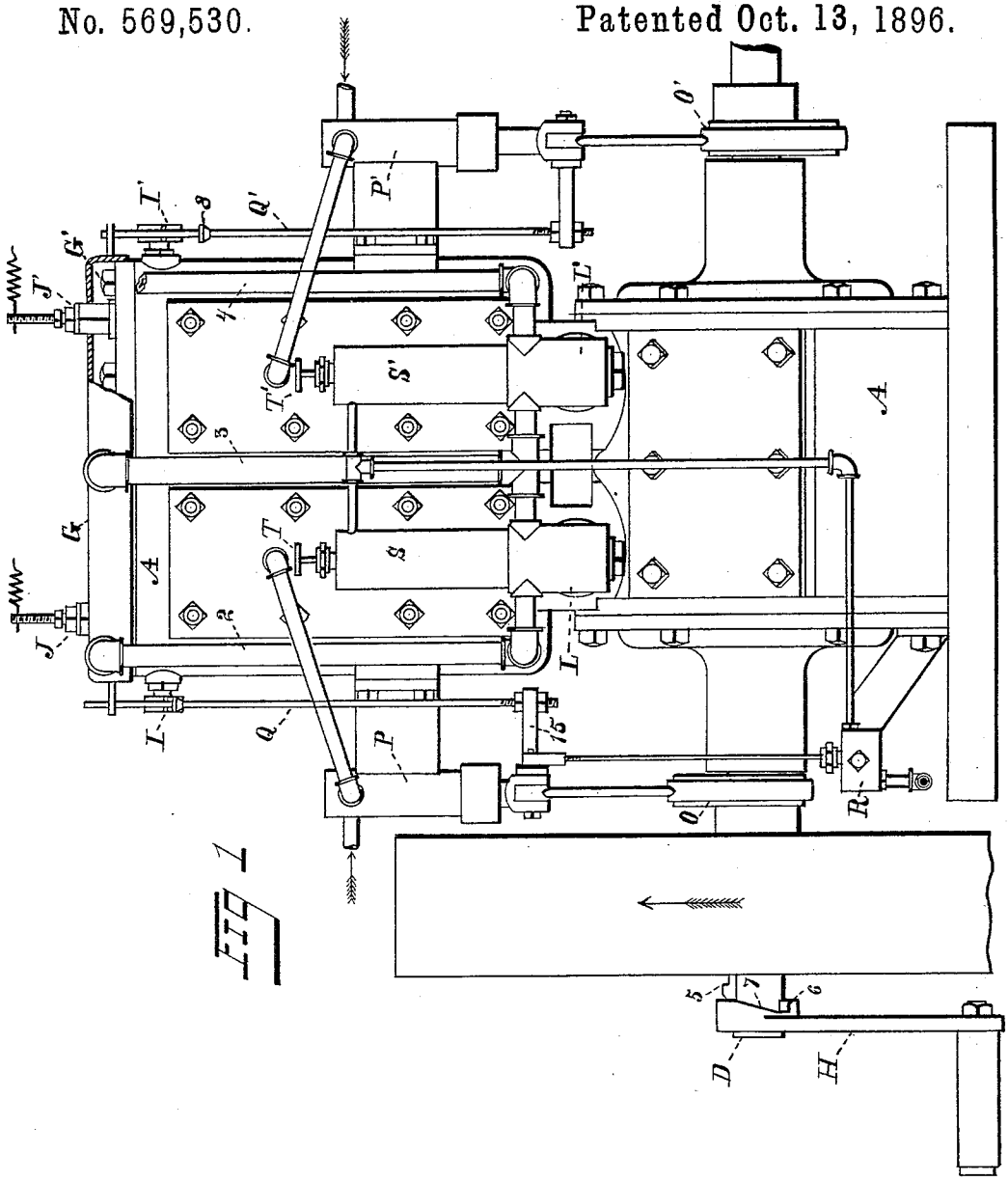

FIG. 1.

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Fig 2

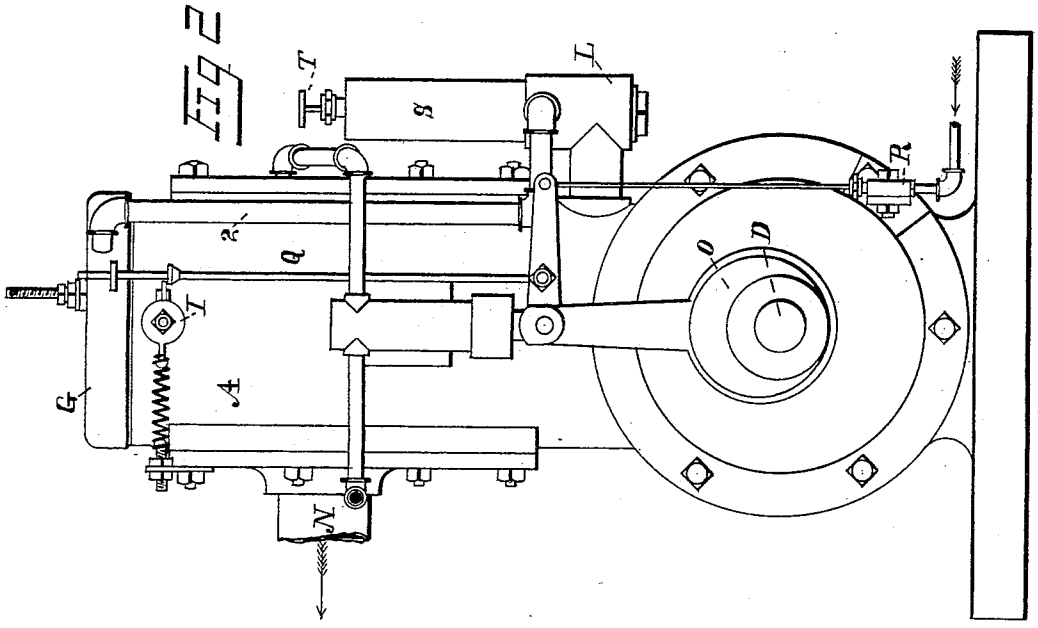

Fig 3

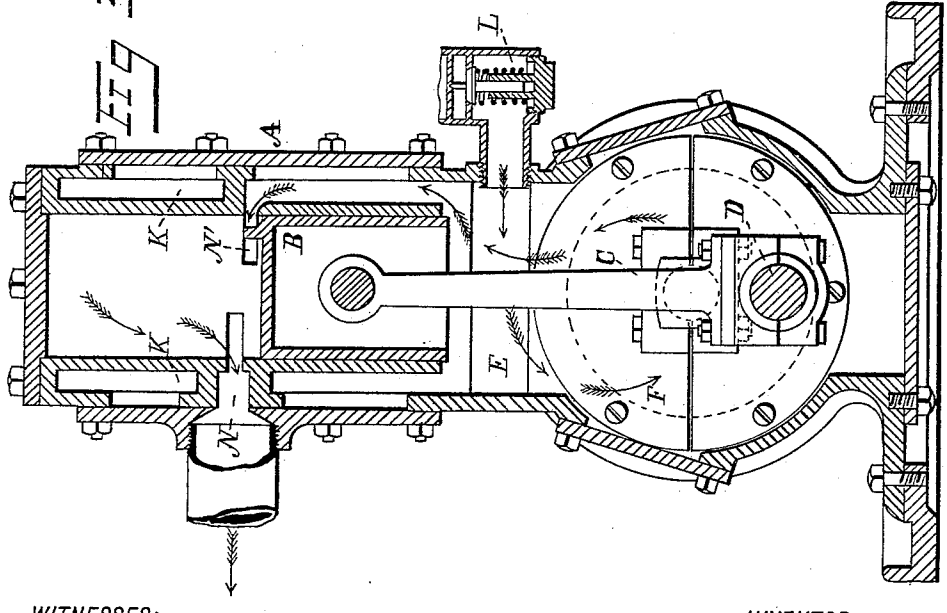

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Fig 4

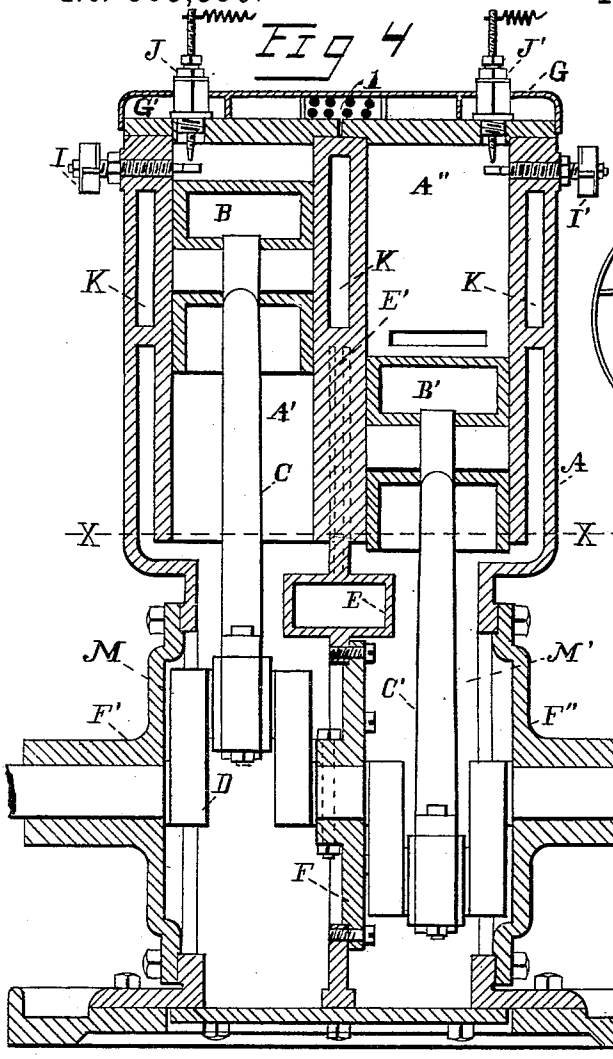

Fig 6

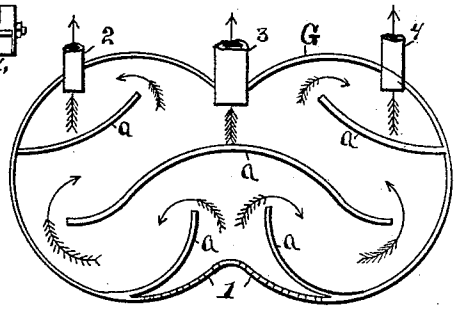

Fig 5

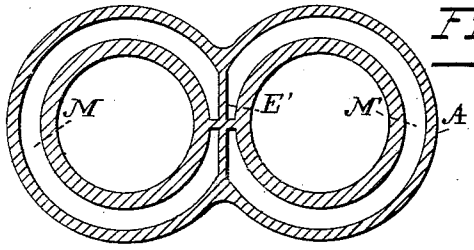

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Fig 7

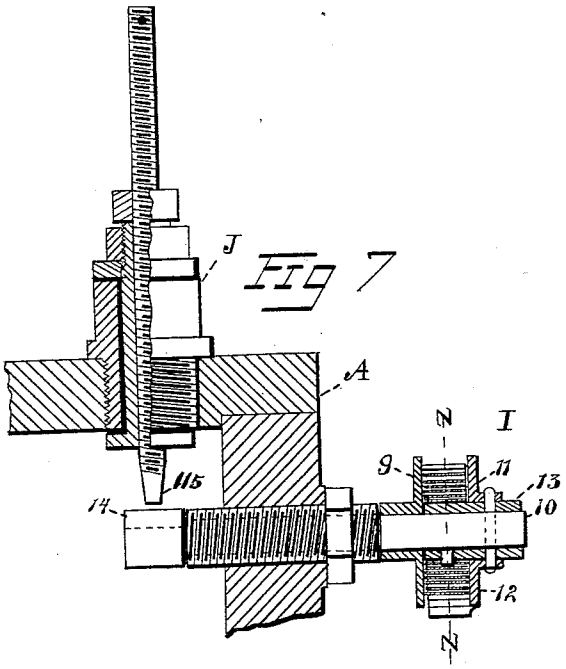


Fig 8

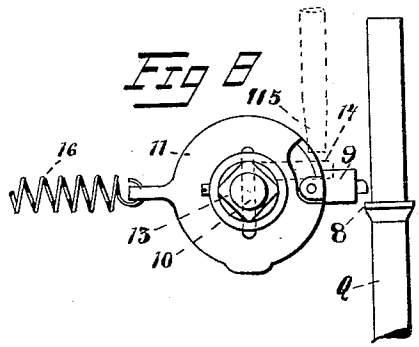
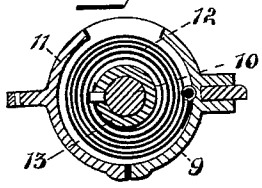


Fig 9



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UNITED STATES PATENT OFFICE.

HARRY A. WINTER, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THE SINTZ GAS ENGINE COMPANY, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 569,530, dated October 13, 1896.

Application filed June 24, 1895. Serial No. 553,897. (No model.)

To all whom it may concern:

Be it known that I, HARRY A. WINTER, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention hereinafter set forth belongs to that class of engines which are driven by the explosion of gas or gaseous vapors.

I have shown the invention as applied to an engine in which there is an explosion at each revolution of the shaft, but parts only of the invention are necessarily confined to this particular description of engine. I have shown the engine also with duplicate cylinders set vertically, and in the following description have used the terms appropriate to this duplicate form and the vertical arrangement, but wish it understood that these are not essential to all of my invention.

I have illustrated my said invention in the accompanying drawings, in which—

Figure 1 represents in front elevation an engine constructed in accordance with my invention. Fig. 2 shows the complete engine in side elevation. Fig. 3 represents a transverse vertical section taken centrally through one of the cylinders. Fig. 4 shows a vertical section of the entire engine, taken centrally through both cylinders. Fig. 5 shows a section of the engine, taken on the line indicated at *x x* in Fig. 4. Fig. 6 shows a horizontal section of the heater. Fig. 7 is a detailed illustration, enlarged, showing in section a part of the cylinder with the igniter applied thereto. Fig. 8 represents in detail the tripping device on the igniter, the parts being represented in side elevation. Fig. 9 shows a section of a part of the tripping device, the section being taken across the axis.

In the drawings the part marked A is the casting, in which are the two cylinders A′ A″, bored out parallel to each other. In these work two pistons B B′. Their connecting-rods C C′ are attached to the piston and the crank-shaft D in the usual manner. The cranks are located in compartments in the base, separated by a partition E F. These compartments are indicated at M M′, and they are separated from each other for the reason that the cranks on the shaft B are set opposite one to the other, which when the machine is in operation causes simultaneous compression in one compartment and expansion in the other. The outside bearings of the crank-shaft are at F′ F″, formed upon the castings which constitute the outside walls or covers at the ends of the chambers. These are removable, as indicated in Figs. 2 and 4, to allow easy access and introduction of the shaft D and center plate F. This center plate F is of smaller diameter than the castings or covers F′ F″, so that it may be readily introduced to its place. It forms a part of the partition between the two compartments and at the same time forms the central bearing for the crank-shaft. The construction allows it to be placed upon the shaft and the whole then to be introduced together.

On the top of the cylinder-casting is placed a heater G. The hot-air space G′ is subdivided by means of partitions *a*, so that the air admitted at 1 is caused to circulate as shown by the arrows in Fig. 6. The other side of the chamber is connected by the pipes 2, 3, and 4 with the interior of the compartments M M′ through the mixing-chamber. The top of the cylinder being hot, the air is drawn through it by the upward stroke of the piston and into compartments M M′ and ultimately into and through the generators.

On the left hand of Fig. 1 I have shown a starting-crank H, loosely mounted on a crank-shaft D. On this shaft is fixed a key 5 inside of the crank, and also on the inside of the crank is fixed a projection 6, having an incline 7, the parts being so arranged that when the crank is turned in the direction of the arrow on the balance-wheel the projection 6 comes into contact with the key 5, which contact, when the motion of the crank is continued, turns the shaft. When the engine is under motion generated by itself, the key 5 moves away from the projection at 6, and then the face of the key 5 runs upon the incline 7 and automatically throws off the crank. Recurring now to the exploder and tripping device, it will be observed that in Fig. 1 two eccentrics O O′ are keyed upon the shaft D

on each side of the engine. To a cross-head 15, connected to each eccentric, there is fixed a vertical rod Q or Q′, having an inclined projection 8, the incline being on the lower side of the projection. Vertical movement of either of these rods will bring the square shoulder of the projection into contact with the projection of the trip 9, of which there is one on each side for each cylinder. Referring particularly to Figs. 7, 8, and 9, it will be observed that the trip 9 is loose on a shaft 10, mounted in the wall of the cylinder. The shaft 10 has on its outer end and fixed thereto a disk 11, arranged to leave a space around the shaft between itself and the disk of the trip 9, in which is a coiled spring 12, one end of this spring being fastened to the disk 11 and the other to the trip. The tension of the spring is regulated by a sleeve 13 and is sufficient to turn the shaft 10, which projects inside of the cylinder and carries an arm 14, arranged to be held by the spring in contact with the adjustable point 15, which, with the arm 14, is in the electric circuit. The parts are properly insulated and so arranged that when the projection 8, moving upward, strikes the trip it turns the shaft so as to cause the arm 14 to move out of contact with the point 15, which causes a spark and explodes the charge. A spring 16 holds the tripping device in normal position and allows the projection 8 to pass on its downward stroke. A water-jacket K is formed in the casting about the cylinders, and circulation therein is caused by the water-pumps P P′, which are worked by the eccentrics O O′, as shown in Fig. 1.

The exhaust-port is shown at N and the receiving-port at N′, Fig. 3. The gasolene-pump is shown at R, and the reservoirs, which are kept full by the gasolene-pump, are shown at S S′. Needle-valves which regulate the flow of gasolene are shown at T T′.

In the operation of my improved engine, the needle-valves being open, the gasolene drops into the generator L, where it is mixed with the hot air brought to the generator by the pipes 2, 3, and 4. Supposing the piston B′, Fig. 4, to be started on the upward stroke by turning the crank H, a charge is drawn into the compartment M′, as indicated in Fig. 3, through the check-valve. On the downward stroke the charge is forced into the cylinder, as indicated by the arrows. The explosion then takes place through the trip, the parts being accurately set to operate at the right time. The exhaust is then made through the port N, which is opened by the piston B on its downward stroke previous to opening the receiving-port N′. The other cylinder goes through a similar process, and as both are connected with the crank they assist each other.

I claim—

1. In a double-cylinder gas-engine, a base, a partition-wall arranged to divide said base into two chambers, a shaft arranged to pass through said base, and a removable bearing for said shaft mounted in said partition-wall, substantially as described.

2. In a gas-engine having a plurality of cylinders and partitioned compartments connected with said cylinders, an outside opening in one of said compartments having a removable cover and an inside opening in the partition smaller than the outside and provided with a cover, the said covers forming the bearings of the crank-shaft, substantially as described.

3. In combination, the cylinder, the box arranged on the top of the same, said box being provided with outlet-openings and being adapted to be heated by the radiation of the heat from the cylinder, the mixing-chamber and the pipes leading from said heater-box thereto, substantially as described.

4. In combination, the cylinder, a cap placed on the cylinder with a space between, said cap having turned-over edges forming a closed heating box or chamber, deflecting-plates located in said chamber, and inlet and exit openings to and from said chamber, substantially as described.

5. In combination in a gas-engine, the igniting device comprising the vertically-movable rod carrying a projection, the stationary contact-arm, the movable contact-arm carrying a fast disk and a loose disk, a yielding connection between said disks with means for adjusting the same, and the trip adapted to be operated by said projection; substantially as described.

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

HARRY A. WINTER.

Witnesses:

WILLARD F. KEENEY,

JESSIE M. BLANCHARD.