O. F. GOOD.

GAS ENGINE.

APPLICATION FILED MAY 10, 1909.

1,012,844.

Patented Dec. 26, 1911.

2 SHEETS—SHEET 1.

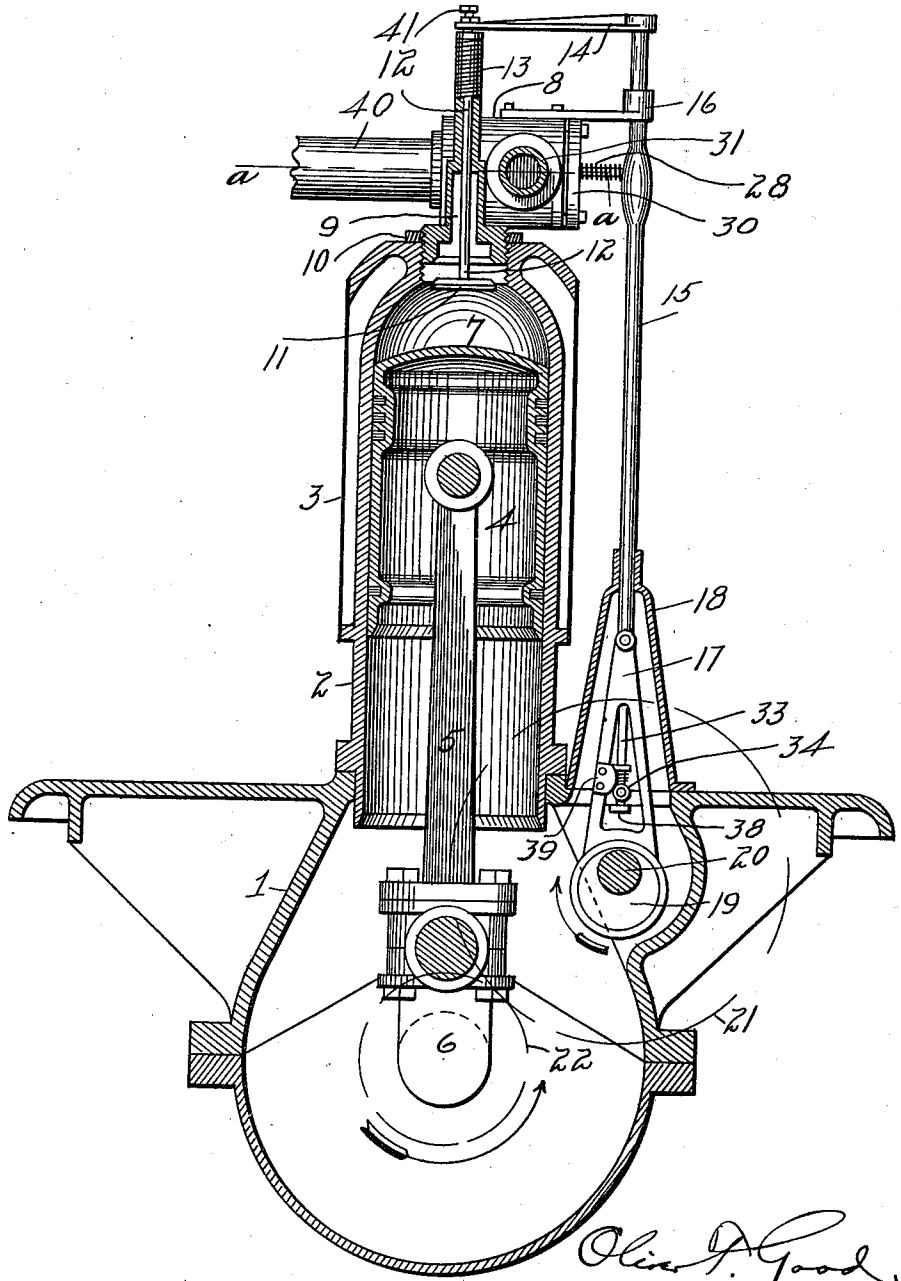

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

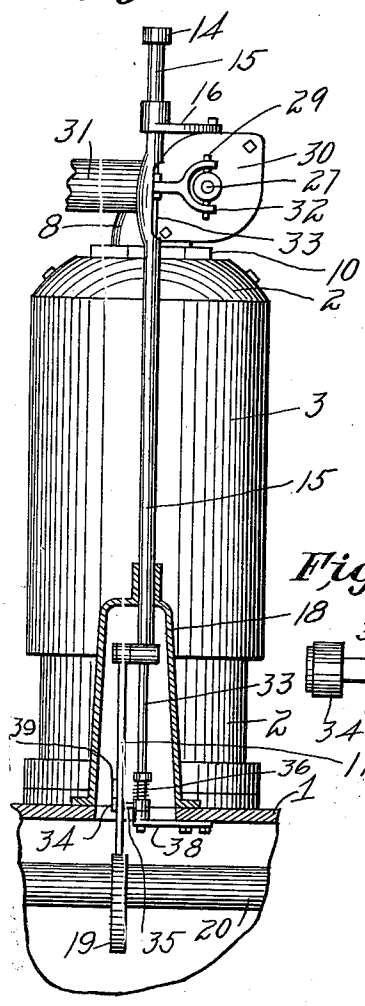


Fig. 3.

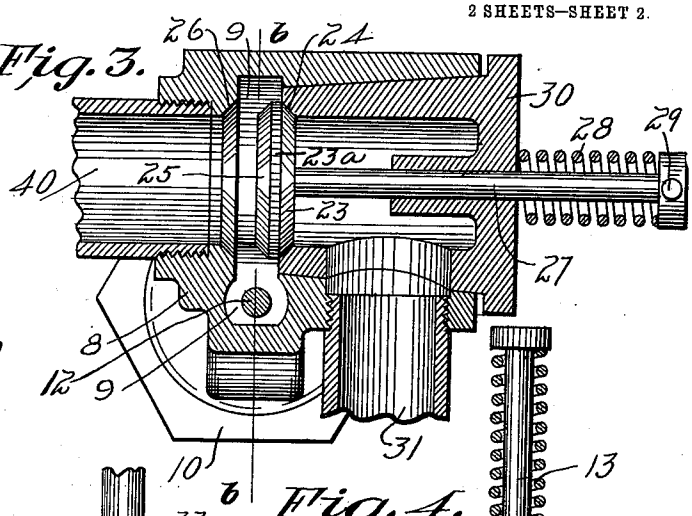


Fig. 4.

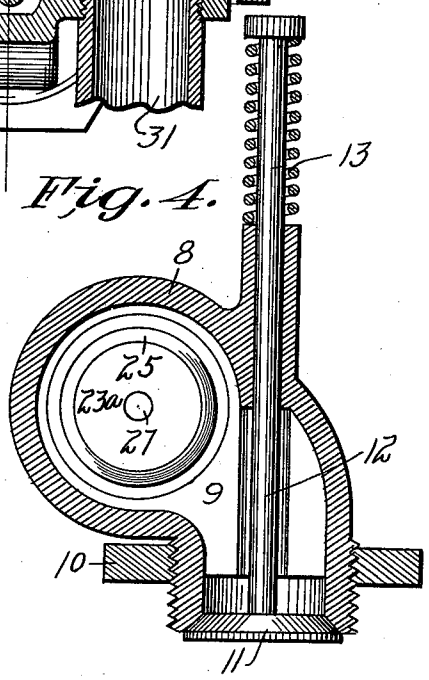
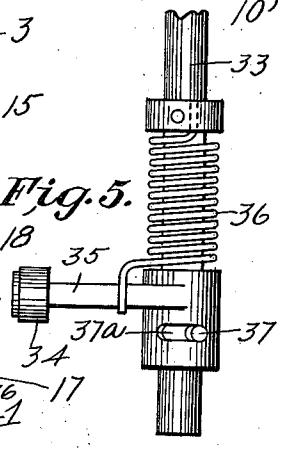


Fig. 5.



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UNITED STATES PATENT OFFICE.

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GAS-ENGINE.

1,012,844. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed May 10, 1909. Serial No. 495,077.

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 Gas-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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in gasolene engines.

The object of the invention is to provide a valve arrangement which avoids the usual over-heating and consequent loss of efficiency in such engines; and a further object is to provide improved actuating mechanism for the valves and the elimination thereby of any tendency to knock which is a common undesirable feature where large cams are used. The means through which these and other incidental objects are accomplished will be hereinafter more fully described in connection with the accompanying drawings, of which,

Figure 1 is a longitudinal vertical sectional elevation of a gasolene engine constructed in accordance with my invention. Fig. 2, is a side elevation of the upper portion of the engine with parts broken away. Fig. 3, is an enlarged sectional view on the line *a a* of Fig. 1. Fig. 4, is an enlarged sectional view on the line *b b* of Fig. 3. Fig. 5, is a detail view of the spring and adjunctive devices located at the lower end of the inner valve-actuating rod.

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

The crank case 1 affords a support for the upright engine cylinder 2 which is provided with the usual water jacket 3. Reciprocating within said cylinder is a piston 4 provided with the usual efficient packing and connected to a crank shaft 6 by connecting rod 5. Above said piston and within the cylinder is the usual compression space 7, and on the top of said cylinder is mounted a valve housing 8 which is connected to said cylinder by a suitable threaded connection and is held firmly in position by a jam nut 10. Within said housing 8 and above the compression space 7, is a combined inlet and exhaust chamber 9 which is separated from said compression space by a valve 11 mounted upon a stem 12. The stem 12 extends vertically through the housing 8, and the valve 11 is normally held to its seat in the lower end of said housing by a spring 13 which incloses the upper portion of the stem. The valve 11 is depressed from its seat or opened through the instrumentality of a cross arm 14 mounted upon a vertically-reciprocating valve rod 15 moving in a guide 16 attached to the valve housing 8, and in a housing 18 attached to the crank case. The lower end of said valve rod 15 is connected to a strap 17 of the eccentric 19, said eccentric being mounted on a shaft 20 journaled in the crank case. The shaft 20 receives movement from the crank shaft 6 through the usual two to one ratio gears 21 and 22 which are shown in outline in Fig. 1. The eccentric 19 is so placed on the shaft 20 that the valve 11 will be open during both the suction and discharge to and from the cylinder. An adjusting screw 41 is provided in the end of the cross arm 14 to regulate the travel or throw of the valve 11. Within the combined inlet and exhaust chamber 9 is placed a duplex valve 23^a having oppositely-disposed inlet valve face 23 and exhaust valve face 25. The face 23 normally rests on the seat 24 of the tapered bushing 30 and controls the explosive mixture as it passes from the inlet 31 to the interior of the cylinder through said chamber 9, and past the valve 11.

When the valve 23 is thrown, the exhaust face 25 will rest upon the exhaust valve seat 26 which is arranged in the valve housing 8, thereby opening the inlet side and closing the exhaust side of the valve 23^a. The exhaust valve face 25 controls the discharge from the cylinder to the exhaust pipe 40. The said valve 23^a is mounted upon a stem 27 which slides in the bushing 30 and is normally pressed outward by a spring 28. On the outer end of the stem 27 is placed a collar having trunnions 29 which are engaged by the bifurcated end of a crank 32 mounted upon a rocking valve rod 33. The reciprocating valve rod 15 is hollow and the valve rod 33 lies within the same, and as will be clearly seen from the drawings, the said valve rod 15 is enlarged and is partly cut away at the point opposite the crank 32,

see Fig. 2. The lower end of the telescoped valve rod 33 is mounted in a bearing 38 attached to the crank case and is provided with a crank 35 which extends through an opening in the eccentric strap 17. The crank 35 is provided with a roller 34 engaged by a cam 39 on the strap 17, and the cam engages the roller 34 during the first cycle to move the valve face 23 from its seat and thus open the inlet to allow the explosive mixture to be drawn into the cylinder. When the valve 23^a is thus thrown, the valve face 25 engages the seat 26; to prevent said valve face 25 from failing to seat when the cam 39 has become worn, the crank 35 is given an excessive movement, and the connection between said crank 35 and the valve rod 33 is made flexible as shown in Fig. 5, where it will be seen that the hub of a crank is provided with a slot 37^a into which projects a pin 37 from the valve rod 33. A spring 36 around said valve rod serves to hold the crank 35 in the position shown in Fig. 5. The pin 37 will travel in the slot 37^a after the valve face 25 engages its seat 26 and thus closes the outlet. It will be understood that the spring 36 is constructed much heavier than the spring 28 on the valve stem 27 in order to insure a complete seating of said valve.

Having thus described the improvements comprised within the scope of my invention, a brief description of the mode of operation is given as follows: At the beginning of the first cycle, the parts are in the position shown in Fig. 1, the valve 11 being open and the valve 23^a being in a position as shown in Fig. 3 which closes the inlet. When the piston 4 descends to draw in a charge, the cam 39 engages the roller 34 thereby rocking the valve rod 33 and opening the inlet valve face 23. When the piston reaches the end of the down stroke the valve 11 closes and the cam 39 releases the roller 34 and thereby allows the valve face 23 to close under the influence of the spring 28. During the second cycle the piston ascends to compress and the valves 11 and 23 are closed. During the third cycle, when the piston descends due to the explosion, the valves are still closed, and when the piston reaches the end of the down stroke of the third cycle, the valve 11 opens and during the fourth cycle the burned gases pass out of the cylinder through said valve 11, chamber 9, and valve 26 into the exhaust pipe 40, thereby completing the four cycles of operation.

I claim:

In an explosive engine, the combination with a cylinder, a piston therein, a crank shaft and connecting rod for driving said shaft, of a single puppet valve controlling the admission and exhaust directly to and from the cylinder, a double puppet valve controlling the admission and exhaust to and from the single puppet valve, an eccentric driven from the crank shaft, an eccentric strap engaging said eccentric, a cam, the eccentric being adapted to actuate the single puppet valve, and the cam being adapted to actuate the double puppet valve.

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

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Witnesses:

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