

APPLICATION FILED OCT. 30, 1902.

Patented May 27, 1913

2 SHEETS--SHEET 1.



Witnesses
J. G. Hinkel
H. M. Gillman Jr.

Inventor
Samuel J Webb
384
John Therman
Attorneys

S. J. WEBB.
GAS ENGINE.

APPLICATION FILED OCT. 30, 1902.

Patented May 27, 1913.

2 SHEETS—SHEET 2.

1,062,999.

Fig. 4.

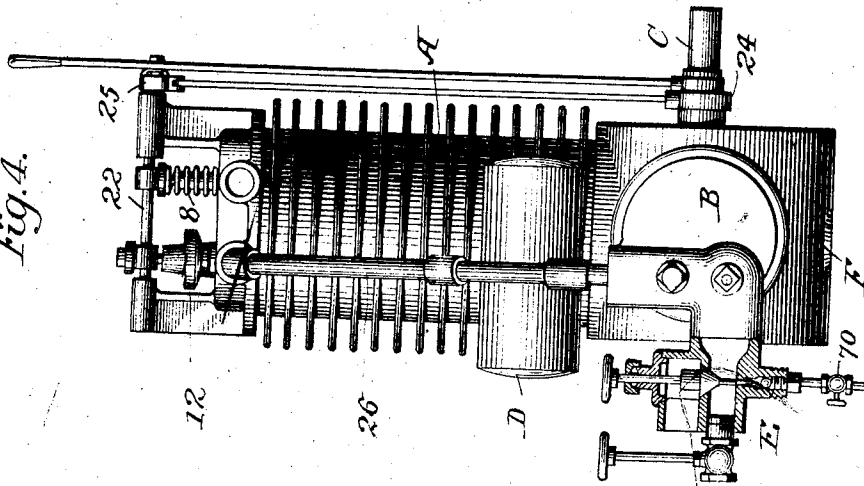
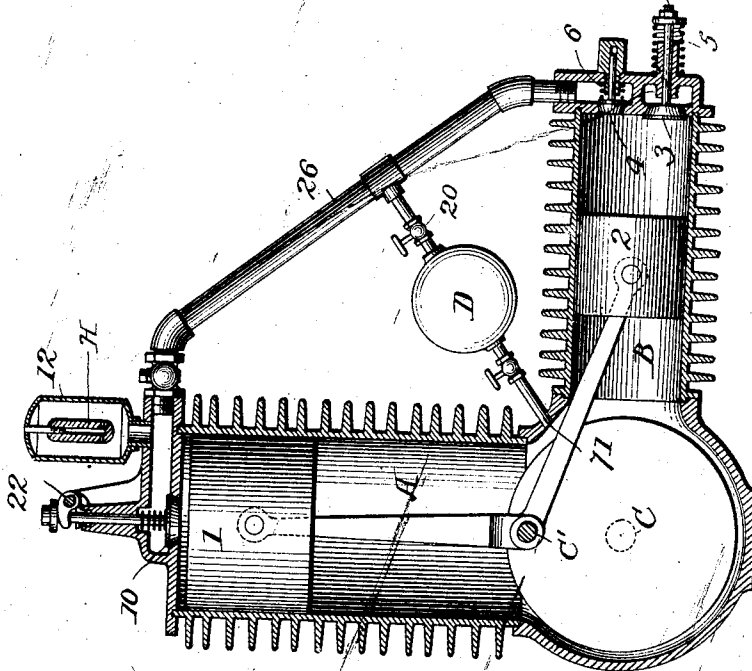


Fig. 3.



Witnesses
J. G. Hinkel
Wm. Gillman, Jr.

Inventor
Samuel J. Webb
By *John Freeman*
Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL J. WEBB, OF MINDEN, LOUISIANA; ROBERT D. WEBB, OF MINDEN, LOUISIANA,
BY INHERITANCE AND BY MESNE ASSIGNMENTS, OWNER OF ENTIRE TITLE.

GAS-ENGINE.

1,062,999.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed October 30, 1902. Serial No. 129,428.

To all whom it may concern:

Be it known that I, SAMUEL J. WEBB, a citizen of the United States, residing at Minden, in the parish of Webster and State of Louisiana, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to gas engines and consists of means for compressing and admitting the charge to the working cylinder, for starting the engine and for preventing the cranks from stopping on a dead center, and of certain details of construction fully described hereinafter and shown in the accompanying drawing, in which:

Figure 1 is a sectional elevation of a gas engine illustrating my improvements; Fig. 2 a side elevation; Fig. 3 a sectional elevation of an engine showing the parts differently arranged; and Fig. 4 a part sectional side elevation of Fig. 3.

There are two cylinders A and B, the cylinder A being the power or working cylinder and the cylinder B being the compression cylinder.

The cylinders have pistons 1, 2, connected to cranks C', C' at less than right angles to each other on the crank shaft C, the connection being such that when the piston 1 is at the upper end of its stroke the ascending piston 2 will have completed about three fourths of its stroke.

With the cylinder B communicate two ports one closed by a valve 3 opening inward, and the other by a valve 4 opening outward, the port of the valve 3 communicating with a chamber or passage *w*, to which a proper explosive mixture passes from any suitable carbureter or air and gas mixing device so that as the piston 2 descends the charge will be drawn into the cylinder B. As the piston 2 descends the valve 3 will be opened against a spring 5 and the valve 4 is normally closed by a spring 6, and will lift on the ascent of the piston 2, after the pressure in the cylinder B is sufficient to overcome said spring, and allow the mixture to be forced into the chamber *y* above the cylinder A, the piston of which is also rising. The piston 1 is of greater diameter than the piston 2, and the cylinder A has an exhaust port closed by a valve 7, seated by a spring 8 and positively opened on the upstroke of the piston 1 after its power stroke as described hereinafter.

In the head of the cylinder A is also a port communicating with the chamber *y* and closed by a valve 10 which is also opened positively.

The charge which is compressed in the chamber *y* may be exploded in any suitable manner either by a spark or by an incandescent block H, in a casing 12 as shown, and as fully set forth in my application for Letters Patent Serial No. 129,429. As the piston 1 reaches the limit of its upward motion the piston 2 is in the act of rising and as it completes its movement the charge is driven from the cylinder B and compressed in the chamber *y* and casing 12, and the valve 10 is positively opened and the charge ignited, driving the piston 1 downward. On the return stroke of the piston 1 the exhaust valve 7 is opened and the valve 10 is closed to prevent the charge which is then being compressed by the upwardly moving piston 2 from passing to the cylinder A, the valve 7 being held open until the piston 1 practically meets the head of the cylinder, completely expelling the whole of the exhaust gases. It will be seen that the engine operates as a two-cycle engine.

I make use of compressed air which is introduced into the cylinder A to start the engine and I prefer to make use of the cylinder B as a pump to secure a supply of compressed air, which is stored in a reservoir or tank D when, as in the case of a traveling motor on a vehicle the piston 2 is operated as the vehicle runs on a down grade. Or in a stationary engine the pumping action may be obtained by suddenly cutting off the gas or oil supply and pumping air as long as the engine runs by momentum. Devices are provided whereby the valves 7 and 10 may be prevented from opening even if the shaft C rotates, such devices being best shown in Figs. 1 and 2.

The shaft 22 is provided with cams for positively opening the valves 7 and 10 at proper positions of said shaft and has at the end a crank pin 40, which extends into a block in the slot of a link 25 which is centrally pivoted at *w* to a swinging arm 43, swinging on the shaft C and provided with a handle whereby it may be swung so as to carry the link upon the said block to bring the latter to either end of the slot in the link. The link at the left-hand end, Fig. 2, is provided with ears for receiving a de-

tachable pin 43^a, passing through the upper end of the rod 26, having at the lower end a strap inclosing an eccentric 24 on the shaft C. When the parts are in the position shown in Fig. 2, the rotation of the shaft and movement of its eccentric will impart an up and down movement to the rod 26 and to the left-hand end of the link 25 and rock the shaft 22. By swinging the arm 43 to the left so that the block of the pin 40 will be opposite pin *w*, the vertical up and down movement of the left-hand end of the latter will be effected as before, but the block in the slot will rock on the pin 40 without imparting any movement to the crank or to the shaft 22.

The tank D communicates with the chamber *y*, a cock 20 closing the communication when the air is not to be pumped. When air alone is admitted to the cylinder B, by the opening of the valve 3 it will pass on the upstroke of the piston 2 into the chamber *y*, and to the tank. To then start the engine it is only necessary to open said valve 20 and admit air to the cylinder A. It will be understood that the air may be stored in the tank D by means of an auxiliary pump or otherwise.

In the construction shown in Figs. 3 and 4, the cylinder B is at an angle to the cylinder A and the valves are shown somewhat differently arranged but the operation is the same. In each case there is the rock shaft 22 with cams operating on the valves to be lifted, said shaft being rocked from an eccentric 24 on the crank shaft with a reversing link 25 as in my application for Letters Patent Serial No. 185,383, by shifting the said link. The valve 10 may be opened either after the piston 1 reaches its upper position so that it will be driven downward to rotate the shaft in one direction, or it may be opened before the piston reaches its upper position and the explosion will drive it downward to reverse the direction of movement of the shaft. In this construction a pipe 26 contains the chamber *y* and the air tank D communicates with said pipe. In Fig. 4 is shown a valve casing E with peculiar valves controlling the oil and air ports as set forth in my application for Letters Patent Serial No. 129,429.

The compressed air may be admitted to the casing F through a pipe 71 communicating with the air vessel D. When the piston 2 is used as an air pump only, the engine may operate an oil pump I from which oil may be pumped through a nozzle *s* into the chamber *y* to mix with the inflowing air and form the explosive mixture.

Since the cranks C' are set at an angle to each other and since the crank casing is closed and air-tight, when one of the cranks is on dead center, the turning moment of its piston is zero, while the turning moment of the other piston is greater than zero. It

will be therefore seen that the engine can never stop on dead center. The tank D in Figs. 1 or 3 is arranged to receive compressed air as when the engine is running down grade or this may be accomplished by opening the valves 20 between the combustion chamber and the tank D, cutting off the oil supply. Now in view of the fact that the turning moment due to the power and compressor pistons is different at any instant, if the power piston should be on dead center, it may be difficult to start the engine by the compressed air arrangement, but if air be admitted to the crank case when the power piston is on dead center the pressure of the air against the compressor piston which has the greatest turning moment will move the power piston off of dead center and in the right direction, since the crank rotates clockwise in Fig. 3. After the power piston has been moved off of dead center, it will be easy to now start it by admitting air above the piston through the valve 10 as previously described.

A torch 41, as shown in my companion application, is indicated in Fig. 2, as a preferred means of heating the igniter 40^a. This igniter is supplemental to the igniter H and is made use of to start the engine in the first instance. After the engine has run for a short time the igniter or block H becomes sufficiently hot to ignite the charge, when the use of the supplemental igniter 40^a may be discontinued.

It will be understood that where I have referred to the use of oil, gas may be substituted therefor. I do not here claim any of the features shown, and also shown and claimed in my aforesaid applications.

Without limiting myself to the construction shown, I claim:

1. In a gas engine, in combination, a working or power cylinder, a compressor cylinder, an explosion chamber connecting the cylinders, pistons for said cylinders, a crank shaft connected to said pistons having cranks set at an angle, the power crank being in advance of the compressor crank, a check valve between the compressor cylinder and explosion chamber, and a valve between the power cylinder and the explosion chamber.

2. The combination with the compression cylinder and piston and working cylinder and piston, of a casing containing an explosion chamber, ports between the said chamber and said cylinders, one having a spring seated valve 4 and the other a valve 10, means for positively opening the valve 10, an exhaust port and valve 7 for said working cylinder, and means for positively opening the latter, an inlet port for the compression cylinder, an air vessel D communicating with the explosion chamber through a channel provided with a valve and also com-

municating with the inner or crank shaft ends of the cylinders and devices whereby to shift said opening means for opening valves 7 and 10 so that said valves are not opened.

5 3. In a gas engine, in combination, a working or power cylinder, a compressor cylinder, an explosion chamber connecting the cylinders, pistons for said cylinders, a crank shaft connected to said pistons having cranks 10 set at an angle, the power crank being in advance of the compressor crank, valves between the cylinders and explosion chamber, and an inclosed air-tight crank case opening into the crank ends of the cylinders.

15 4. In a gas engine, in combination, a working or power cylinder, a compressor cylinder,

der, an explosion chamber connecting the cylinders, pistons for said cylinders, a crank shaft connected to said pistons having cranks set at an angle, the power crank being in 20 advance of the compressor crank, a check valve between the compressor cylinder and explosion chamber, and a positively operated valve between the power cylinder and the explosion chamber.

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

SAMUEL J. WEBB.

Witnesses:

H. M. GILLMAN, Jr.,

W. CLARENCE DUVALL.