S. J. WEBB.

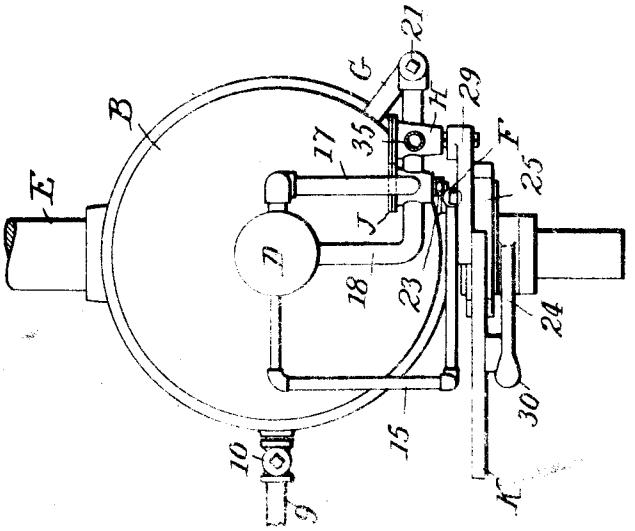
GAS ENGINE.

APPLICATION FILED DEC. 16, 1903.

1,031,601. Patented July 2, 1912.

3 SHEETS—SHEET 1.

Fig. 4.



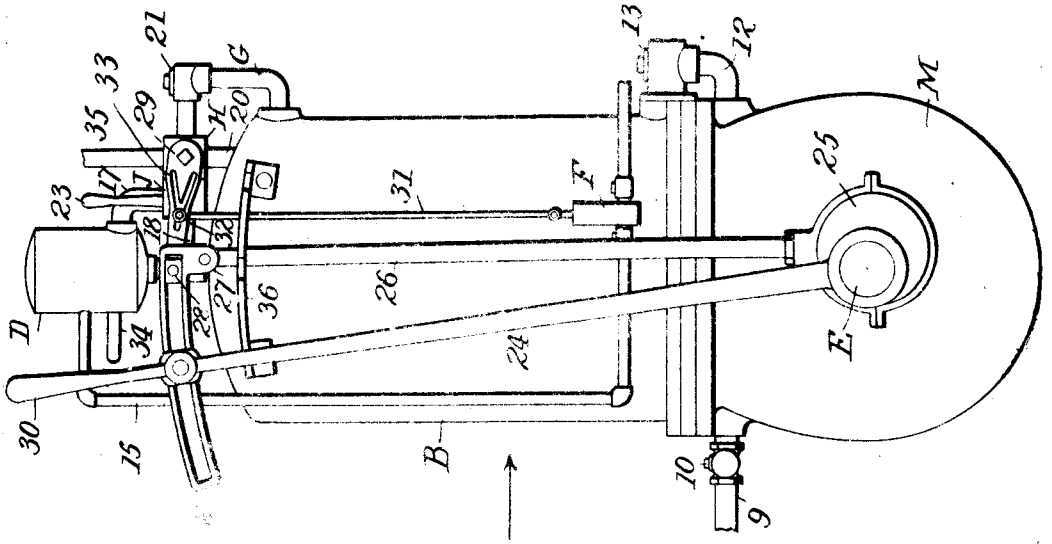


Fig. 1.

Witnesses.
H. M. Gillman, Jr.
G. N. Freeman

Inventor
Samuel J. Webb
by Foster Freeman & Watson
Attorneys

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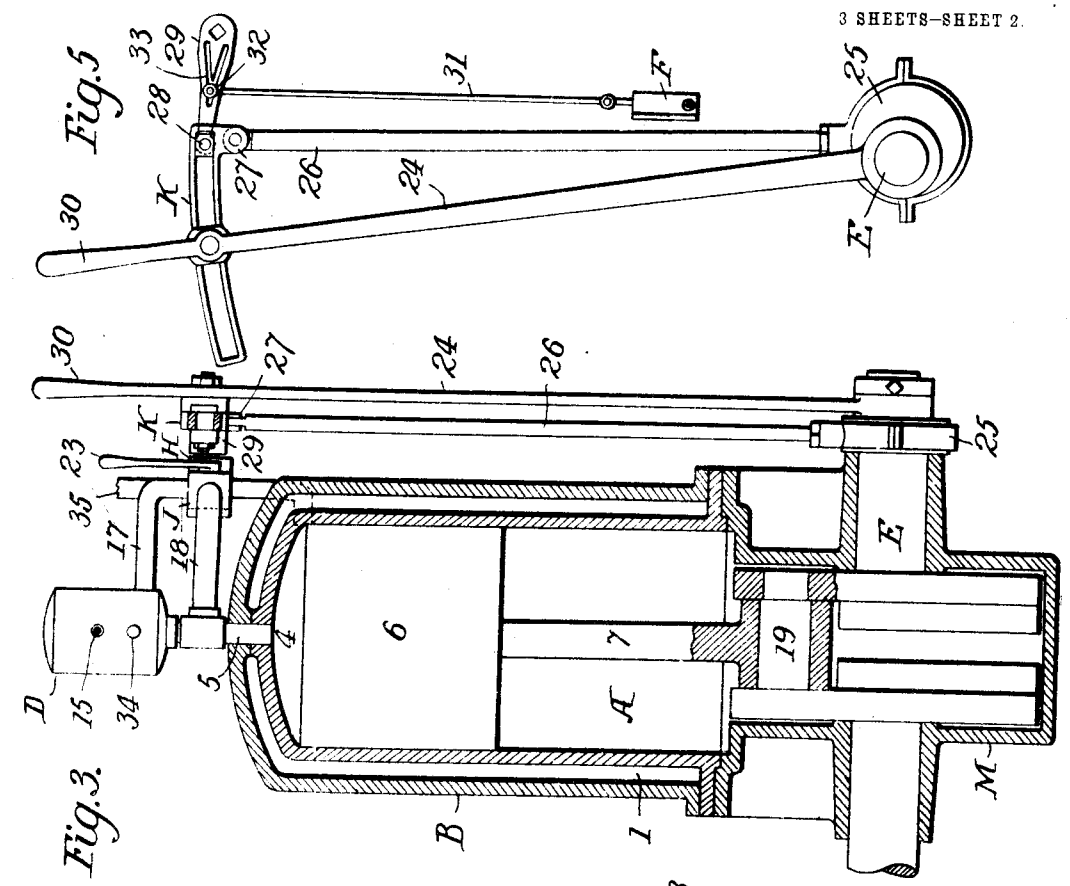
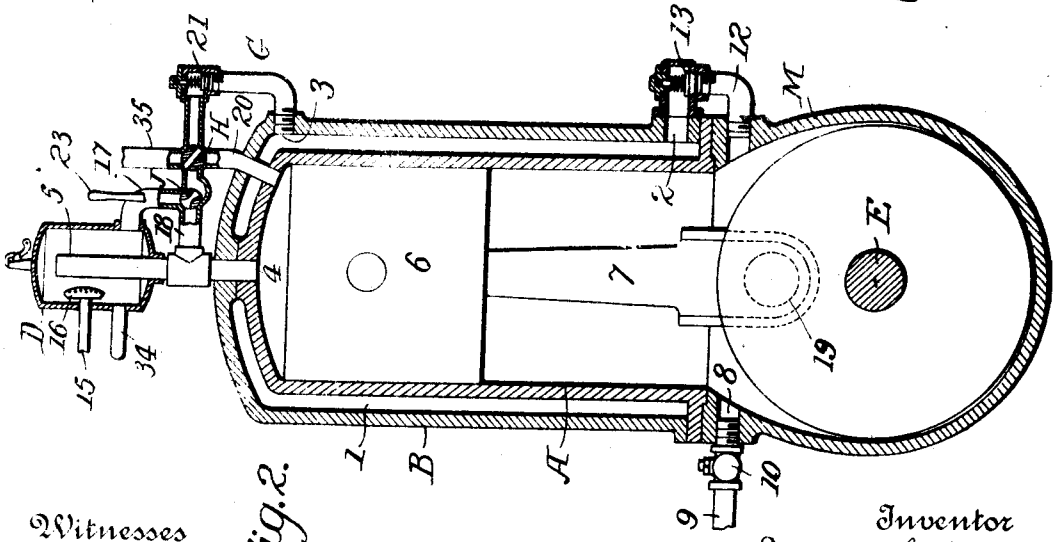
3 SHEETS—SHEET 2.





Witnesses

Inventor

Samuel J. Webb

By Foster Freeman Watson

Attorney

WEBB.

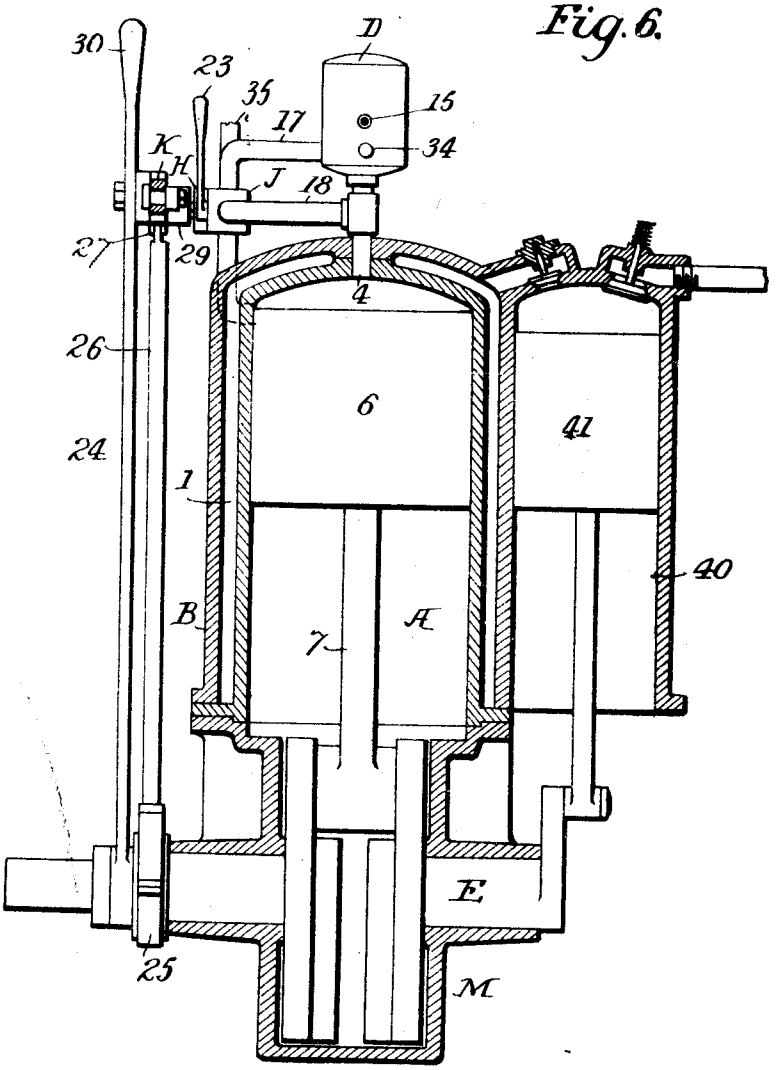
APPLICATION

1,031,601.

1912.

3 SHEETS SHEET 3

Fig. 6.



Witnesses
H. M. Gillman Jr.
G. R. Freeman

Inventor
Samuel J. Webb

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.

1,031,601. Specification of Letters Patent. Patented July 2, 1912.

Application filed December 16, 1903. Serial No. 185,383.

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 in which the piston may be operated either by burning or exploding a gaseous mixture, and consists in details of construction whereby to compress the air and combine it with vaporized oil to form an explosive mixture, while maintaining the cylinder in a comparatively cool condition, as fully set forth hereinafter and as illustrated in the accompanying drawing, in which—

Figure 1 is an outside elevation of a gas engine embodying my improvements; Fig. 2 is a sectional elevation; Fig. 3 is a section at right angles to the section Fig. 2 looking in the direction of the arrow, Fig. 1; Fig. 4, a plan of Fig. 1; Fig. 5, a detached view illustrating the arrangement of the pump and valve operating means; and Fig. 6, a sectional elevation illustrating a modification.

The cylinder A is surrounded by a jacket B forming an intermediate chamber 1, which is closed except an inlet port 2, and an outlet port 3, a port 4, at the end of a pipe 5 extends upward nearly to the top of a casing D.

The lower end of the cylinder communicates with a casing M through which extends the driving shaft E, the crank wheels arranged within the casing and supporting the wrist pin 19 connected with the piston 6 by the connecting rod 7.

With the casing M communicates a port 8 through which air may pass from a pipe 9 provided with a check valve 10 opening inward, so that as the piston rises, air is drawn into the casing M, and as the piston descends, the air is forced out of the casing and through a pipe 12 provided with a check valve 13, and is forced into the chamber 1, through the port 2, the chamber 1 being of such dimensions that the air will be compressed therein.

The air from the chamber 1 may be carbureted in any suitable manner, but the explosion of the charge above the piston serves to heat the pipe 5 and the casing D so that when oil is injected into the casing D against the pipe 5 the oil will be vaporized, and I provide means for carrying the air from the chamber 1 into the casing D where it will mix with the vapor of the oil and pass down the pipe 5 into the cylinder in the form of an expanding gas either burning or exploding according to its character, the ignition after the engine has started being effected by the heat of the pipe 5 within the casing D.

The oil is forced by a pump F, or otherwise at the proper time, into a pipe 15 communicating with a spray or nozzle 16 arranged within the casing D to direct the oil onto the pipe 5.

The air passes from the chamber 1 through a pipe G having two branches 17, 18, the branch 17 communicating with the casing D and the branch 18 with the pipe 5, and through the latter with the cylinder.

In the line of the pipe G is a valve J so constructed that according to its position, there may be a passage through the pipe G, and branch 17 to the casing D, or through both branches 17 and 18 to both the casing D and the cylinder, or through pipe G and branch 18 to the cylinder. The exhaust controlled by the valve H may pass from the cylinder through the pipe 20 and valve H to the exhaust pipe 35.

The valve H and the pump may be operated in any suitable manner from any moving part of the engine. The operation is such that when the piston descends, it compresses the charge and forces it into the chamber 1, the check valve 10 in the pipe 9 closing against the pressure.

When the piston rises, the spent gases are forced outward through the pipe 20 and valve H to the exhaust 35, the exhaust valve being open.

When the piston is at the top of the cylinder, the valve H will have been turned to close the exhaust 35 and to permit the compressed air to pass from the chamber 1 through the pipe G and branch 17 to the casing D, and the oil being injected into the latter, combines with the air, forming a burning or explosive mixture by which the piston is forced downward, another charge of air being thereby compressed in the chamber 1.

As before stated, a portion of the air may, if desired, pass through the branch 18 and into the cylinder as the piston descends,

thereby reducing or affecting the character of the explosion and regulating the temperature of the motor gases, and this is secured in any desired degree by means of the valve J or other suitable means, which may be set by means of a handle 23 or otherwise so as to permit all of the air to pass through the pipe 17 to the explosion casing D or so as to permit part of it to pass to the said casing and part to the cylinder A, or all of it to cylinder A.

While any desired means may be employed for operating the pump and the valve H, I prefer to operate the valve H by means of a reversing link K pivoted at one side to an arm or rod 24 which swings upon the shaft E as a fulcrum, the said link being reciprocated by an eccentric 25 on the shaft, the rod 26 of which is connected to a lug 27 at one end of the link. This link receives a pin 28 at the end of an arm 29 on the plug of the valve H, and by shifting the link, the action of the valve may be reversed, this shifting being readily accomplished by grasping a handle 30 extending upward from the rod 24, which may be held in position by the notches on the bar 36.

The pump F may be operated from the arm 29 through the medium of a rod 31 and to adjust the throw of said rod, it may be connected at the upper end to a pin 32 which may be set in any desired position in a forked slot 33 in the arm 29. The fork in the slot permits the pin 32 to be set below the axis of the valve to reduce the extent of movement.

The charge in the explosion casing D may be fired in starting the engine through the medium of a firing tube 34 heated by a torch, or by an electric spark or otherwise.

When the engine stops, the pressure of air under the piston will cause it to rise and hold it near the top of the cylinder, and if the valves of the casing I do not leak it will retain the air under pressure and the engine can be started in either direction by shifting the link, admitting air to the cylinder, which will force the piston down and cause the engine to rotate, thus forcing oil into the chamber D, which mixes with the air and is ignited.

I do not wish to limit myself to this particular construction or to a single cylinder engine, for in some cases it may be desirable to have a plurality of cylinders to avoid dead centers, which will admit of easy starting.

It is not always essential to charge the chamber 1 by compressing the air by means of the piston 6. For instance, as shown in Fig. 6, there is a separate air pump cylinder 40 having a piston 41 connected with a crank on the shaft E and the air may be forced from the cylinder 40 into the chamber 1 through the medium of a pipe provided with a check valve. In either case, however, the chamber surrounding the main piston receives a body of compressed air which not only cools the cylinder but in so doing absorbs so much heat that it materially aids in vaporizing the oil and in rapidly securing a combustible or explosive mixture. Further, the body of compressed air in the chamber 1 serves when the reversing link is shifted to first arrest and then reverse the engine.

It will be seen that the shifting of the link both regulates the cut off, by varying the opening of the valve H, and simultaneously varies the throw of the pump.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim as my invention:—

1. The combination with the cylinder, piston and chamber surrounding the cylinder and means for compressing air therein, of an explosion chamber communicating with the outer end of the cylinder through a pipe 5, a channel communicating with the said chamber and with the said pipe 5 and a valve in said channel, and passages arranged to permit the air to pass directly to the pipe 5 or to the explosion chamber, or to both.

2. The combination with the cylinder, piston and chamber surrounding the cylinder and means for compressing air therein, of an explosion chamber communicating with the outer end of the cylinder through a pipe 5, a channel communicating with the said chamber and with the said pipe 5 and a valve in said channel, passages arranged to permit the air to pass directly to the pipe 5 or to the explosion chamber or to both, an exhaust pipe leading from the cylinder, and a valve in said pipe controlling the flow through the same and also arranged to control the flow through the channel of communication between the said chamber and the pipe 5.

3. The combination with the cylinder of a gas engine, of a casing containing a vaporizer communicating with the cylinder, an air inlet pipe communicating with the said vaporizer and with the cylinder, and a valve whereby to direct the air to the vaporizer or to both vaporizer and cylinder, substantially as set forth.

4. In a gas engine, the combination with a cylinder having a piston therein, of a jacket surrounding the cylinder forming a heating chamber, means to maintain a supply of air under pressure in the heating chamber, a vaporizer communicating with the cylinder by a pipe extending into the vaporizer, a conduit between the vaporizer and heating chamber, and a valve in said conduit.

5. In a gas engine, the combination with

a cylinder having a piston therein, of a jacket surrounding the cylinder forming a heating chamber, means for maintaining a supply of air under pressure in the heating chamber, a vaporizer communicating with the cylinder, a conduit between the heating chamber and the vaporizer, and a conduit between the heating chamber and the cylinder, and a valve in the first conduit.

6. In a gas engine, the combination with a cylinder having a piston therein, of a jacket surrounding the cylinder forming a heating chamber, means for maintaining a supply of air under pressure in the heating chamber, a vaporizer communicating with the cylinder, a conduit between the heating chamber and the vaporizer, a conduit between the heating chamber and the cylinder, an automatically operating valve for controlling both conduits, and a manually controlled valve for controlling the proportions of air supplied to the conduits.

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

SAMUEL J. WEBB.

Witnesses:
F. L. FREEMAN,
G. P. KRAMER.