(No Model.)

C. C. WRIGHT & W. J. STEPHENS.

GAS ENGINE.

No. 584,448. Patented June 15, 1897.

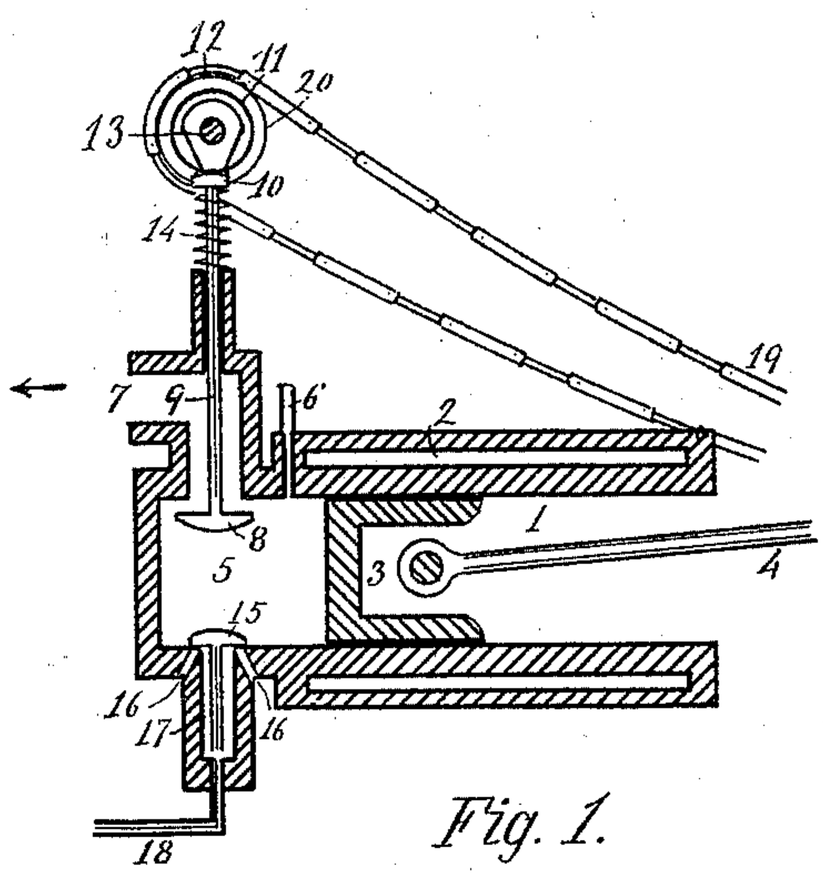

Fig. 1.

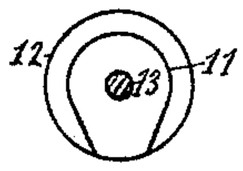

Fig. 3.

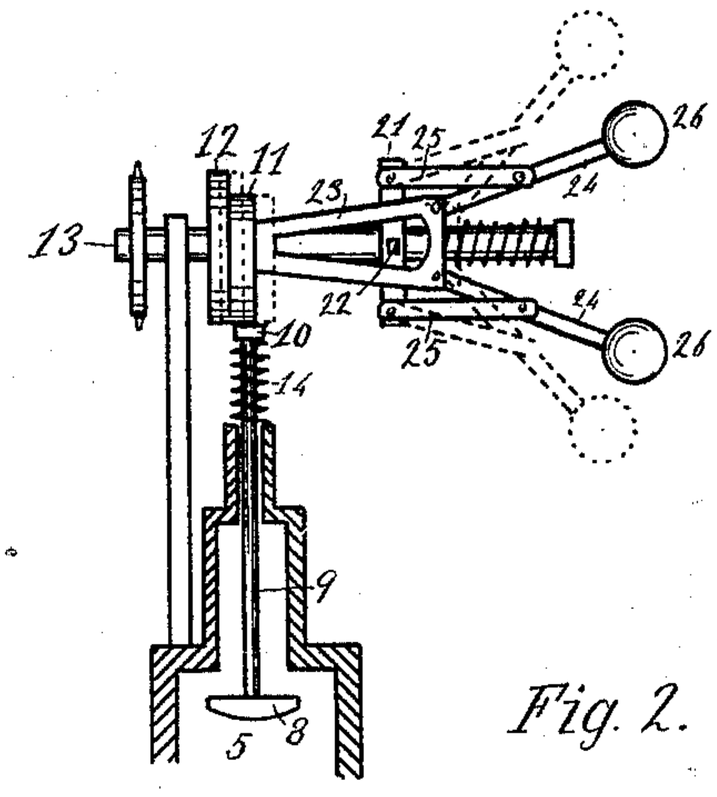

Fig. 2.

Witnesses:
A. B. Howland.
Chas. A. Ridgway.

Cornelius C. Wright:
William J. Stephens.
INVENTORS

BY Joseph Smith
ATTORNEY.

UNITED STATES PATENT OFFICE.

CORNELIUS C. WRIGHT AND WILLIAM J. STEPHENS, OF TITUSVILLE, PENNSYLVANIA; SAID WRIGHT ASSIGNOR TO SAID STEPHENS.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 584,448, dated June 15, 1897.

Application filed September 8, 1896. Serial No. 605,144. (No model.)

To all whom it may concern:

Be it known that we, CORNELIUS C. WRIGHT and WILLIAM J. STEPHENS, citizens of the United States, and residents of Titusville, in the county of Crawford and State of Pennsylvania, have invented new and useful Improvements in Gas-Engines, of which the following is a specification.

Our invention relates to that class of engines or motors in which the power is derived from the explosion at frequent intervals of a mixture of air and gas in a closed chamber, the explosion giving an impulse to a single-acting piston in a cylinder, the piston communicating the motion through a connecting-rod to the crank and fly-wheel of the engine, our object being to simplify and perfect the manner of introducing the explosive mixture and in the cheap and simple construction of the engine.

In the accompanying drawings, Figure 1 is a sectional view of the cylinder, piston, &c., with the compression-chamber, inlet and outlet valves, and the manner of operating the same; Fig. 2, a side view of the governing device, and Fig. 3 an enlarged view of the cam and disk operating the discharge-valve.

In the several views the same numbers are used to indicate the same parts.

1 is the cylinder, surrounded by the water-space 2; 3, the piston; 4, the rod, connecting the piston to the crank-shaft, (not shown;) 5, the compression-chamber; 6, the ignition-tube; 7, the exhaust-pipe.

8 is a valve closing the passage from the compression-chamber to the exhaust-pipe. This valve opens inwardly, as shown, and has the valve-stem 9, extending up through the exhaust-pipe and the wall of the same, terminating in the cap 10.

11 is a cam, and 12 a disk on the shaft 13 of the governor.

14 is a coiled spring holding the valve 8 closed except when the cap 10 is forced down by the cam or disk. The face of the cam is so formed that the valve 8 is closed three-fourths of the revolution of the cam.

The cam and disk are formed of one piece or are firmly secured to each other, the disk being of a radius equal to the projecting surface of the cam. When the engine is running at its normal speed, the cap 10 is opposite the cam, but when the speed is increased more than the normal by the mechanism hereinafter described the cam and disk are drawn forward, so that the surface of the disk bears on the cap, and while in this position the valve 8 is held open continuously.

At the bottom of the compression-chamber is a second valve 15, closing the inlet air-passages 16 and the inlet gas-passage 17. This valve opens upward and is operated and controlled by suction and gravity only, being closed by gravity and opened only when the valve 8 is closed and the piston is drawn forward, creating a vacuum in the combustion-chamber.

18 is a gas-pipe. The air-passages are so directed that the incoming air and gas mingle immediately on entering the compression-chamber.

The governor-shaft 13 is driven by the sprocket-chain 19, which leads from a sprocket-wheel on the main shaft of the engine (not shown) to the sprocket-wheel 20 on the shaft 13. The sprocket-wheel 20 is twice the diameter of the one on the main shaft, thus producing one revolution of the shaft 13 to two of the main shaft. The governor on the shaft 13 is constructed and operates as follows: An adjustable cross-arm 21 is placed on the arm 13, to which it is firmly secured by the set-screw 22. 23 is a yoke on either side of the shaft 13, attached at one end to the cam 11, and to the other end the arms 24 of the governor are hinged. The swinging braces 25 are hinged to the extremities of the cross-arm 21 and to the arms 24 of the governor about midway between the yoke 23 and the balls 26, forming a fulcrum. The arm 21, being adjusted and secured firmly to the shaft 13, revolves with it and has no motion lengthwise of the shaft, while the cam and disk, being secured only by a sliding key, revolves with the shaft but has liberty to move forward and back, the result being that when the engine is at rest or running at its normal speed the balls with the cam and disk take the position shown in full lines in Fig. 2, the cap 10 only bearing against the cam 11; but when the speed is materially increased the balls fly out, drawing forward the yoke and

with it the cam and disk until the disk 12 is brought partially or entirely over the cap 10, taking the position shown by the dotted lines in Fig. 2, holding the valve 8 open the entire time.

The operation of the engine is as follows: It being designed to explode but one charge of air and gas at each second revolution of the engine, and then only when the speed of the engine is reduced below the normal, at the first forward motion of the piston (the valve 8 being closed) the valve 15 is opened by suction and the air and gas drawn in through the passages 16 and 17. The return of the piston closes the valve, compresses the mixture, and when at the proper compression it is exploded. The explosion gives a forward impulse to the piston, accelerating the speed of the engine. At the end of the forward stroke the projection on the cam 11 opens the valve 8, when the return of the piston drives from the combustion-chamber the foul air and burned gas, leaving it free for a repetition of the operation. Thus the chamber is charged and exploded at each second revolution of the engine until the speed equals or exceeds the normal, when the governor draws the disk 12 forward over the cap 10. Then the valve 8 is held constantly open. Air alone is drawn in and expelled through the exhaust-pipe and valve 8. There is no suction to raise the valve 15, no explosive mixture is admitted, and no confined air or burned gas in the compression-chamber retards the backward motion of the piston. This continues until the speed is reduced to or below the normal, when the governor returns the cam 8 to its original position. No water-jacket is required around the compression-chamber, the surrounding and continuous passage of cold air keeping the valves sufficiently cool so there is no warping of the metal.

It will be noticed that in this device there is only one valve operated directly by the engine. The valve 15 is operated by natural causes in opening by the vacuum produced by the forward motion of the piston and closing by gravity and the compression in the cylinder.

We claim as our invention—

1. In a gas-engine; the governor-shaft 13, with the combined cam 11, and disk 12, thereon, the cam and disk being capable of motion lengthwise of the shaft and controlled in this motion by the governor-balls, the cam or disk bearing against the end of the valve-stem 9, and so arranged and controlled that when the engine is running at or above its normal speed the end of the valve-stem bears against the disk, but when below the normal, against the cam; the valve-stem at the other end attached to and operating the inwardly-opening valve 8; and with the coiled spring 14, holding the end of the valve-stem against the cam or disk; in combination with the second inwardly-opening valve 15, normally closing the air-passages 16, and the gas-passage 17, but adapted to be opened by suction when the valve 8 is closed and the piston is moving forward, admitting air and gas which mingle on entering the compression-chamber: substantially as shown and described.

2. In a gas-engine; the valve 8, opening inwardly into the compression-chamber, with the valve-stem 9, extending through the exhaust-pipe and the wall of the chamber; in combination with a cam and disk on the shaft of the governor, the cam bearing against the stem 9, and controlling the operation of the valve except when the engine exceeds the normal speed, when the disk is drawn forward over the stem holding the valve constantly open until the speed is reduced to the normal; substantially as shown and described.

3. As a device for sliding the cam and disk on the governor-shaft; the cross-bar 21, firmly secured to the shaft; the yoke 23, connected at one end to the cam and disk, at the other end having the arms of the governor-balls hinged thereto; the braces 25, hinged at one end to the extremities of the bar 21, and at the other end to the respective arms of the governor-balls between the yoke and the balls; all the parts working in combination and operating to draw the cam and disk forward on the shaft of the governor as the speed of the engine is increased; substantially as shown and described.

4. In a gas-engine; the combination of the governor-shaft driven by a sprocket-chain from the main shaft of the engine, the governor-shaft making one revolution to two of the main shaft; the governor on said shaft constructed as described and operating a sliding cam and disk; the inwardly-opening valve 8, in the compression-chamber, with the stem passing through the walls of the chamber and bearing against the cam or disk; the cam so constructed and adjusted as to hold the valve open during the alternate returns of the piston when the engine is running at its normal speed but when above the normal the disk is drawn forward holding the valve constantly open; and with the inwardly-opening gravity-valve 15, covering the inlet gas and air openings: substantially as shown and described and for the purpose herein set forth.

CORNELIUS C. WRIGHT.
WILLIAM J. STEPHENS.

Witnesses:
A. B. HOWLAND,
W. D. BEEBE.