(No Model.)

C. QUAST.

GAS ENGINE.

No. 588,876. Patented Aug. 24, 1897.

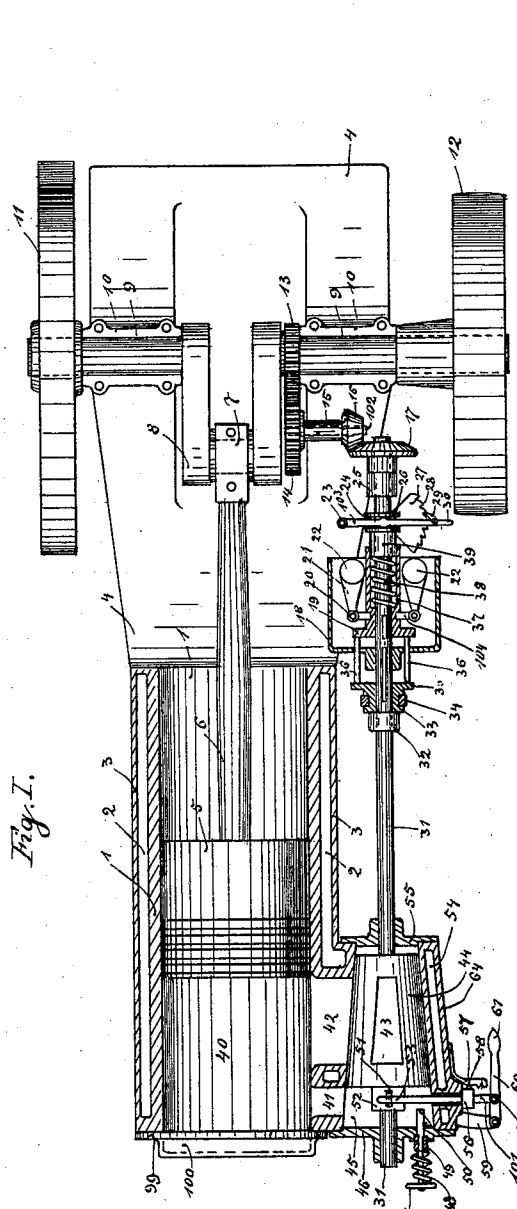


Fig. I.

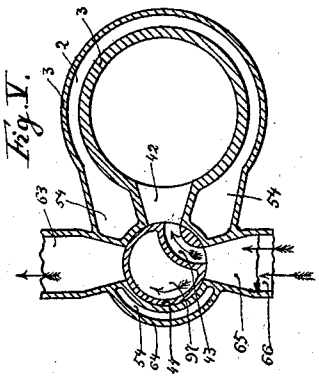


Fig. V.

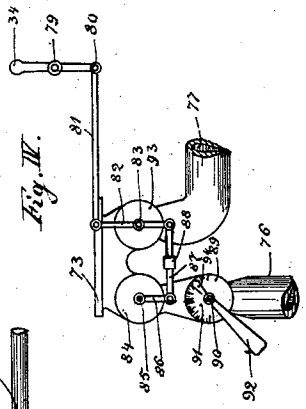


Fig. IV.

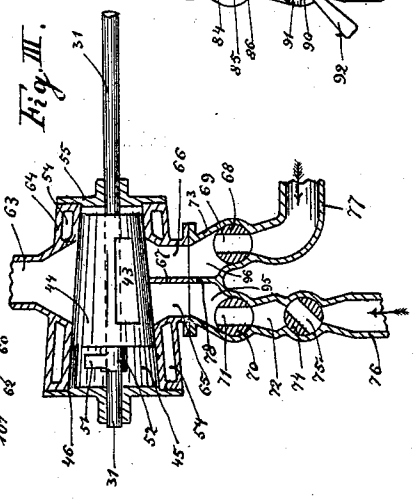


Fig. III.

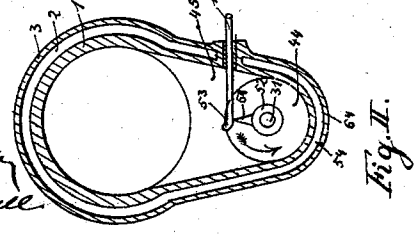


Fig. II.

Witnesses:
W. Dandaker
Wm. F. Hall

Inventor.
Chas. Quast.

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UNITED STATES PATENT OFFICE.

CHARLES QUAST, OF MARION, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 588,876, dated August 24, 1897.

Application filed September 5, 1894. Serial No. 522,180. (No model.)

To all whom it may concern:

Be it known that I, CHARLES QUAST, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, 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.

It is the object of my invention to provide a simple form of engine in which the quantity of fuel admitted will be regulated by the governor and to generally improve the valve and governor mechanism in order to secure the highest efficiency.

Figure 1 is a plan sectional view through the engine. Fig. 2 is a vertical cross-section of the cylinder and valve-chest, showing the igniter. Fig. 3 is a longitudinal section through the valve-chest and governor-valves. Fig. 4 is a front view of the governor arrangement. Fig. 5 is a cross-section through the cylinder and valve, showing the inlets and outlets.

Cylinder 1 is carried by bed-plate 4, which carries in journals 10 crank-shaft 9, the latter carrying fly-wheel 11 and pulley 12. Piston 5 moves back and forth in cylinder 1 and is connected by connecting-rod 6 to crank-pin 7 of crank-shaft 9. Cylinder 1 has a valve-chest, in which rotates valve 44. Valve-chest has a supplemental chamber 45, which is connected by conduit 41 with combustion-chamber 40. Gear 13, rigid on crank-shaft 9, meshes in gear 14, the latter transmitting motion, by pinion 16 and gear 17, to the valve-shaft 31, which carries a governor and the igniting-prong 51. The governor acts through lever 34, rod 81, lever 82, rod 87, and lever 86 upon throttling-valves 68 and 70.

77 is the air-pipe, and 76 is the gas-pipe, leading through chambers 65 and 66 into mixing-chamber 43 and from there through chamber 42 into the cylinder.

The operation is as follows: The rotating valve 44 will cause communication between chambers 65 66 and chamber 42 one time and between chamber 42 and outlet 63 another time, the timing of the valve being such that at one stroke of the piston air and gas are drawn in through their respective pipes 76 and 77 and through chamber 43 into the cylinder. At the return stroke these communications are closed off and the charge is compressed. At the moment the piston has reached its extreme limit prong 51 will leave electrode 53, which causes a spark, thus firing the charge and shoving the piston backward. At the return stroke the valve will open communication between the cylinder and pipe 63, through which the waste products will escape. By this arrangement the piston makes four complete strokes to one revolution of the valve. Igniter-bar 101 has a bent point 53 to allow prong 51 of collar 52 to move in either direction without danger of breaking. Prong 51 rubs igniting-rod 101 with every revolution, thus keeping the surface clean and preventing corrosion. The relative position of point 53 and prong 51 can be regulated by moving collar 56, which has a projection which fits in notches 58 of spring 57, thus preventing moving of the igniting-rod 101. Valve-shaft 31 carries rigid governor-disk 18, which carries in bearings 20 governor-arms 21 and balls 22. Governor-arms 21 have projections 104, which fit in a groove of sleeve 37, said sleeve being movable longitudinally only on shaft 31. Sleeve 37 carries flange 19, which connects through rods 36 with flange 35 of collar 33, which is movable longitudinally only on valve-shaft 31. Sleeve 37 carries in a recess spring 38, which is compressed by sleeve 39, which enters into sleeve 37. Sleeve 39 has groove 24, in which rests lever 103, the latter pivoted to 23 and locked by latch 29 and notches 28 of quadrant 27. Moving hand-piece 30 of lever 103 and placing latch 29 in either of the notches 28 will increase or decrease the tension of spring 38, thus acting upon governor-balls 22. The converging or diverging of the governor-balls 22 will move collar 33 on valve-shaft 31 and with it fork 34, which pivots at 79 and connects at 80 with rod 81 and by lever 82, fulcrum 83, rod 87, lever 86, and fulcrum 85 with the valves 70 and 68, the latter having passages 71 and 69. As sleeve 33 moves valves 70 and 68 will be open more or less, thus increasing or decreasing the amount of charge, and consequently the power of explosion. The maximum movement of collar 33 is regulated by collar 32 and the amount of the maximum and minimum opening of the throttling-valves 70 and 68 is regulated by turning rod 81 in swivel 80, and the

relative amount of opening is regulated by turn-buckle 88. The gas passes through pipe 76, stop-cock 74, chamber 72, and through opening 71 of throttling-valve 70 into chamber 65. The air passes through pipe 77 and chamber 69, into chamber 66. Chambers 65 and 66 are separated by division-walls 67 and 78. Both chambers coincide with chamber 43 of valve 44. Chamber 43 is used as a mixing-chamber for air and gas, and as there is no communication between chambers 65 and 66 and chamber 43 the gas and air are shut off separately. Cut-off cock 74 is used to regulate the gas before it passes through the throttling-valve.

In starting the engine lever 60, with handpiece 61, pivoted at 59 and carrying igniting-rod 101 at 62, is shoved inward until collar 56 with its projection has reached the farthest notch 58 of spring 57, thus causing prong 51 to leave point 53 of bar 101 at a later point of the revolution, which causes a later ignition of the charge. After the engine has made one explosion the lever 60 is pulled outward, thus bringing point 53 in a position to cause the gases to explode earlier. Rod 50, carrying hand-wheel 47 and spring 48, is also used in starting the engine. After the air and gas are drawn in and compressed hand-wheel 47 may be shoved inward, thus bringing contact between igniting-bar 101 and rod 50, and by letting wheel 47 loose spring 48 will withdraw rod 50 from bar 101, thus causing a spark and igniting the charge. In case bar 101 and the point of rod 50 are covered or corroded rod 50 may be turned by hand-wheel 47 when in contact, thus causing a scraping between the surfaces and clearing away any corrosion. As soon as the charge lights hand-wheel 47 is let loose and the rotating prong 51, when leaving point 53 of rod 101, will continue the igniting of the respective charges. The governor controls the amount of air and gas drawn in to suit the power to be developed by the engine, thus increasing or decreasing the strength of explosion and thus keeping the speed of the engine uniform. When the governor-balls are farthest apart, then the throttling-valves are closed and no charge can enter the cylinder. The speed of the engine may be set by hand-lever 30 without stopping the engine; also the moment of explosion can be regulated while the engine is running by moving collar 56. The amount of air and gas drawn in or the relative proportions can be regulated by turning rod 81 or turnbuckle 88 while the engine is running.

One of the principal points is that all adjustments can be made with the engine at full speed.

I claim—

1. In combination in a gas-engine, the cylinder and piston, the air and gas supply, the valve, the valve-chest and the igniter-chamber in said chest at the end of the valve and communicating with the combustion-chamber of the engine through a port which is independent of the valve and of the port controlled thereby, substantially as described.

2. In combination in a gas-engine, the cylinder and piston, the inlet-valve the automatic igniter including the electrodes and the push-pin arranged to act as an electrode when operated by hand, said push-pin being independent of the electrodes of the automatic igniter, substantially as described.

3. In combination in a gas-engine, the cylinder, the piston, the valve mechanism, the rotary shaft, the governor thereon comprising the sliding sleeve with connections to the valve mechanism and the collar 32 on the rotary valve-shaft to limit the movement of the sleeve and regulate the position of the valve, substantially as described.

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

CHARLES QUAST.

Witnesses:
FRED. E. GUTHERY,
H. J. JURY.