No. 607,879. Patented July 26, 1898.

C. QUAST.

GAS ENGINE.

(Application filed Jan. 5, 1895.)

(No Model.)

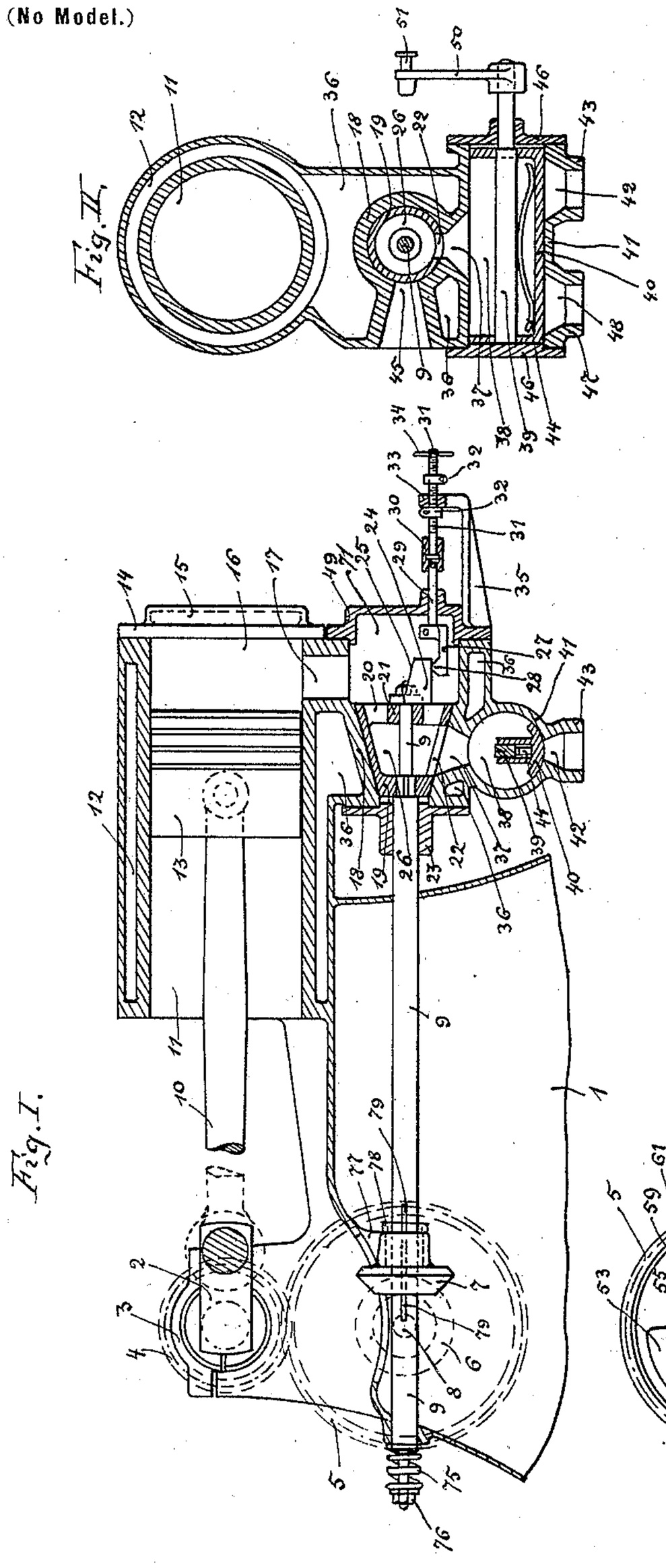

Fig. I.

Fig. II.

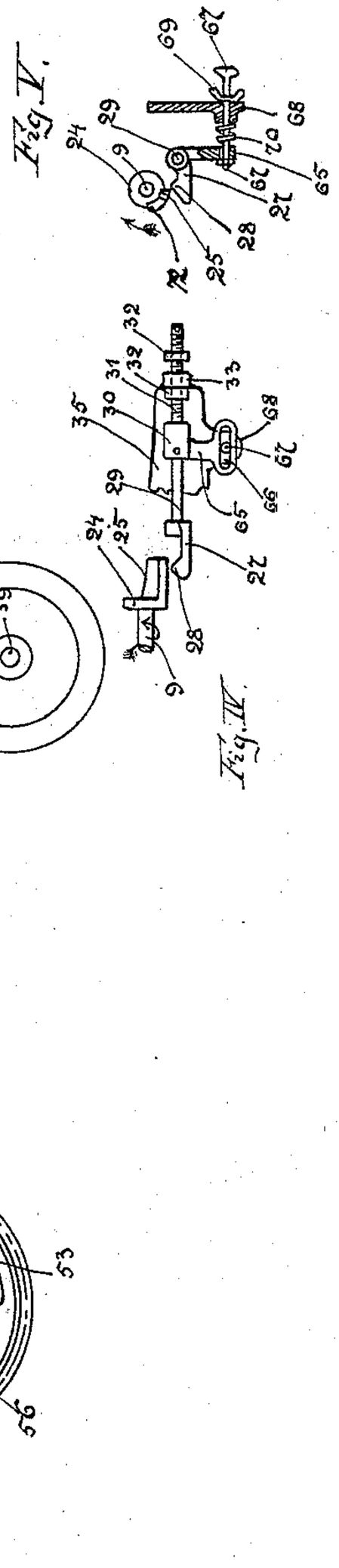

Fig. V.

Fig. IV.

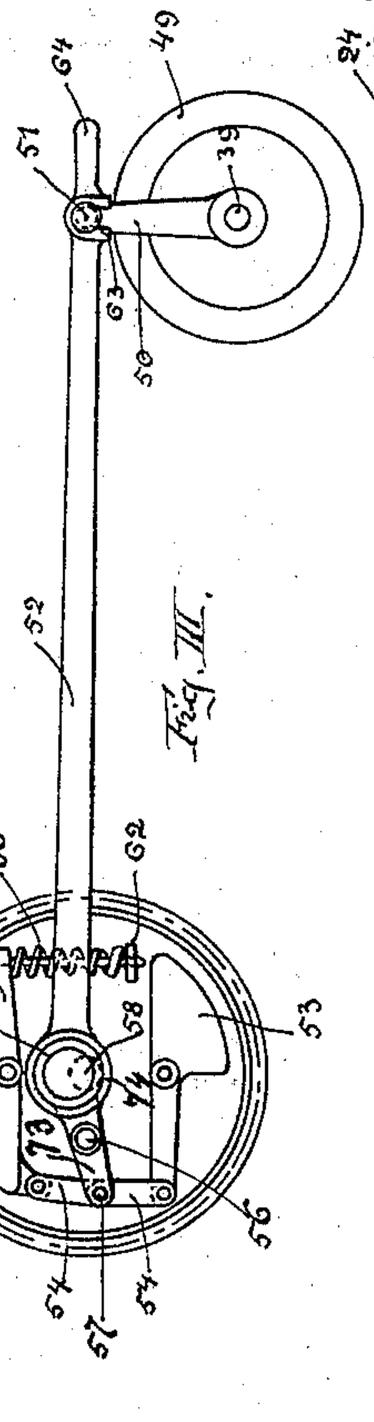

Fig. VI.

Fig. III.

Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES QUAST, OF BUCYRUS, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 607,879, dated July 26, 1898.

Application filed January 5, 1895. Serial No. 533,915. (No model.)

To all whom it may concern:

Be it known that I, CHARLES QUAST, a citizen of the United States, residing at Bucyrus, in the county of Crawford 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.

Figure 1 is a longitudinal vertical section through the cylinder and valve-chest. Fig. 2 is a vertical cross-section through cylinder and valve-chest. Fig. 3 shows governor and arrangement with oscillating valve. Figs. 4 and 5 show igniter.

The bed-plate 1 carries crank-shaft 2 and cylinder 11. The gear 4 on crank-shaft 2 meshes in governor-gear 5, the latter being fixed on the shaft 8. The shaft 8 carries the bevel-gear 6, which meshes in the bevel-gear 7. The bevel-gear 7 is splined on shaft 9, which carries hollow cylindrical conical valve 19, which rotates in valve-seat 18. The cylinder 11 carries valve-seat 18 and valve-seat 41, the latter having inlets 48 and 42. The valve-chamber 38 communicates through port 37, the valve-port 22, and mixing-chamber 26 with the igniting-chamber 71, and through the port 17 with the combustion-chamber 16. The conical valve-seat 18 has an exhaust-port 45. The oscillating valve 40 is moved by the rod 39, lever 50, and rod 52, the latter connecting with the governor through ring 74. The valve 40 is held in its seat by the spring 44, which is placed between valve-stem 39 and the bottom of the valve. The rotating valve-stem 9 passes through the valve 19 and carries the igniting-pole 24. The rotating valve-stem 9 carries on the other end the spring 75, which is held in position by nut 76, and presses against the bed-plate 1, thus keeping the rotating valve in its seat.

The combustion-chamber cover 49 carries the igniter-rod 29, and this rod carries the igniting-dog 27. The rod 29 carries fixed on the other end the coupling 30, said coupling having an extension 65, provided with a slot 66, which is movable longitudinally and vertically about a pin 67. The pin 67 carries a spring 70 between lever 65 and the extension 68 of the bracket 35. The coupling 30 carries a screw 31. The latter is screwed through a part 33 of the bracket 35 and also carries lock-nuts 32 and has a turning pin 34. The valve-seat 18 and igniting-chamber 71 are surrounded by water-chamber 36. The gear 5 carries on pins the swiveled weights 53, one of which with its tail end connects by the links 54 with the opposite weight 53, and the tail end 59 of this weight is in contact with a spring 60, which is on a pin 61 and bears against a rib 62. The lever 73 pivots on a point 56 and with its tail end 57 connects with links 54. The ring 55 of lever 73 carries the eccentric ring 74, which is part of rod 52. The crank-shaft 2 connects through connecting-rod 10 with piston 13. Bracket 77 supports gear 7 and collar 78 keeps the gear in its place.

58 in Fig. 3 represents the center of rotation.

The operation is as follows: As crank-shaft 2 rotates gears 4, 5, 6, and 7 rotate, and with them shaft 9, hollow conical valve 19, and igniter-pole 24. As valve 19 rotates communication is formed between valve-chamber 38 and igniting-chamber 71 through mixing-chamber 26, port 22, and port 37 in one part of the revolution, and between igniting-chamber 71 and exhaust-port 45 through mixing-chamber 26 and port 22 in another part of the revolution. These communications are alternate as the valve rotates. Valve 40 is oscillated by rotating ring 55 of the governor. Valve 40 opens both ports 48 and 42 at the same time that port 22 of valve 19 crosses port 37 of valve-seat 18. As the igniter-point 24 rotates point 72 will come in contact with point 28 of igniter-dog 27. This will cause igniting-dog 27 to move backward, which causes the compression of spring 70 through lever 65. Igniting-dog 27 is released after leaving contact with dog 24 on surface 25. Surface 25 is taper, as shown in drawings, and in moving movable igniting-dog 27 longitudinally point 28 will be released earlier or later. The amount of such movement is positively regulated by lock-nuts 32. In starting the engine screw 31 is screwed inward until the outer lock-nut 32 comes in contact with thread-support 33, thus causing point 28 to move toward the valve 19, and this causes a later

release between point 28 and surface 25. After the engine has attained a normal speed screw 31 is screwed outward until the inner lock-nut 32 touches the inner surface of the threaded support 33, thus bringing point 28 toward the narrow end of igniting-dog 24, and point 28 will be released earlier from surface 25. The extreme positions of point 28 are regulated by moving either lock-nut 32 or screw 31, thus giving a regulatable, positive, early, or late ignition of the charge. When the engine has reached a certain speed, governor-weights 53 will spread, thus causing, through links 54 connecting 57, tail 73, and fulcrum 56, the movement of center of ring 55 toward the center of shaft 8, thus reducing the eccentrical movement of ring 55, bar 52, lever 50, and the oscillating movement of valve 40, and thus diminishing the amount and length of opening of ports 48 and 42. If the speed of the engine continues to increase, the center of ring 55 will finally reach the center of shaft 8, thus stopping valve 40 from moving, and this keeps either both of the ports 48 or 42 or only one of them closed. The speed at which the standstill of valve 40 occurs is regulated by spring 60. The variation of oscillation of valve 40 causes the drawing in of heavier or lighter charges of explosives, and thus causing heavier or lighter explosions to comply exactly with the load the engine has to pull. If the load increases, the speed of the engine will diminish slightly, thus causing governor-weights to converge, and this will increase the eccentrical movement of ring 55 and the opening of valve 40, thus allowing a heavier charge to enter into the cylinder and giving a heavier explosion. On the other hand, if the load should diminish the speed of the engine will slightly increase, thus causing the governor-weights to diverge, and this will decrease the eccentrical movement of ring 55 and the opening of valve 40, thus allowing a lighter explosion. If such diminishing of load should continue, governor-weights 53 will have reached their extreme point, thus keeping valve 40 at or nearly at a standstill, thus keeping one or both of the ports closed and preventing the suction of a charge.

The rod 52 has open end 63 and handpiece 64, which allows pin 51 to be disengaged and moving valve 40 in such position as to allow gas to enter the engine in starting. The ignition-chamber 71 is located at the larger end of the valve 19, thus exposing the largest end to the pressure, thus keeping the valve seated. For the same purpose is spring 75 placed at the end of the rotating rod 9 to draw the rotating valve in its seat when there is no pressure in the explosion-chamber. The air and gas inlets are kept in constant relation to each other. Valve-stem 9 can move in gear 7 without changing the position of gear 7. Gear 7 is supported by bracket 77 and allows the shaft to slide with key 79 in gear 7. Spring 75 keeps valve and valve-stem in the normal position.

I claim—

1. In combination, the cylinder, the piston, the hollow conical valve, having its larger end open, and the ignition-chamber communicating with the hollow conical valve, substantially as described.

2. In combination the cylinder, the piston, the rotary main valve, the rotary shaft therefor, the oscillating supplemental valve, the gearing for rotating the rotary shaft, the pitman for operating the oscillating pitman and the governor carried by the gear-wheel and connected to the pitman substantially as described.

3. In combination, the cylinder, the piston, the rotary main valve, the rotary shaft therefor, the oscillating supplemental valve, the crank-shaft, the gears 4 and 5 and the bevel-gears 6 and 7 for rotating the rotary valve-shaft, the pitman for oscillating the supplemental valve and the governor operated by the gearing and connected to the pitman, substantially as described.

4. In combination, the cylinder, the piston, the rotary main valve of hollow conical form, the combustion-chamber 16, the ignition-chamber 71, a mixture-chamber in the hollow valve, a suction-chamber, the supplemental valve therein and the exhaust-port, said hollow valve having a port arranged to connect the combustion, ignition and mixing chambers with the suction-chamber in one position and to connect the combustion-chamber, ignition-chamber and mixing-chamber with the exhaust in another position, substantially as described.

5. In combination the cylinder, the piston, the rotary valve of hollow form having an open end, the igniting-chamber at the open end of the valve, the igniter therein, one pole of which is carried by the open end of the valve and the lateral port in the valve leading to the interior thereof, substantially as described.

6. In combination the cylinder, the piston, the valve mechanism, the igniter comprising the moving pole, the yielding pole, the rotary shaft therefor under tension, and the screw for adjusting the yielding pole and the stops for limiting said adjustment.

7. In combination the cylinder, the piston, the valve mechanism, the igniter comprising a pole 24 and an adjustable pole and the positive stops for limiting the position of the adjustable pole in one of two predetermined positions substantially as described.

8. In combination the cylinder, the piston, the valve mechanism, the igniter comprising the pole 24, the pole 28, the shaft carrying the same, the coupling 30, the arm 65 secured thereto and under spring tension, and the adjusting-screw connected to the coup-

ling and having stops substantially as described.

9. In combination the cylinder, the piston, the valve mechanism and the igniter comprising the taper-pole 24 and the pole to engage therewith said poles being adjustable relative to each other to vary the length of contact along the taper surface.

10. In combination the cylinder, the piston, the valve mechanism and the igniter comprising the yielding pole 28, the oscillating shaft carrying the same and means for adjusting the pole longitudinally.

11. In combination, the cylinder, the piston, the valve mechanism and the igniter device comprising the poles adjusted to have longer or shorter contact, the adjusting means and the adjustable lock-nuts for limiting the movement of the adjusting means substantially as described.

12. In combination, the cylinder, the piston, the rotary valve, the rotary stem therefor, the oscillating valve controlling the supply to the rotary valve, the shaft 8, the pitman for operating the oscillating valve, the governor connected to the pitman and arranged to rotate axially of the shaft 8 and the gearing between the shaft 8 and the valve-shaft, substantially as described.

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

CHARLES QUAST.

Witnesses:
A. J. YAWGER,
W. H. CULP.