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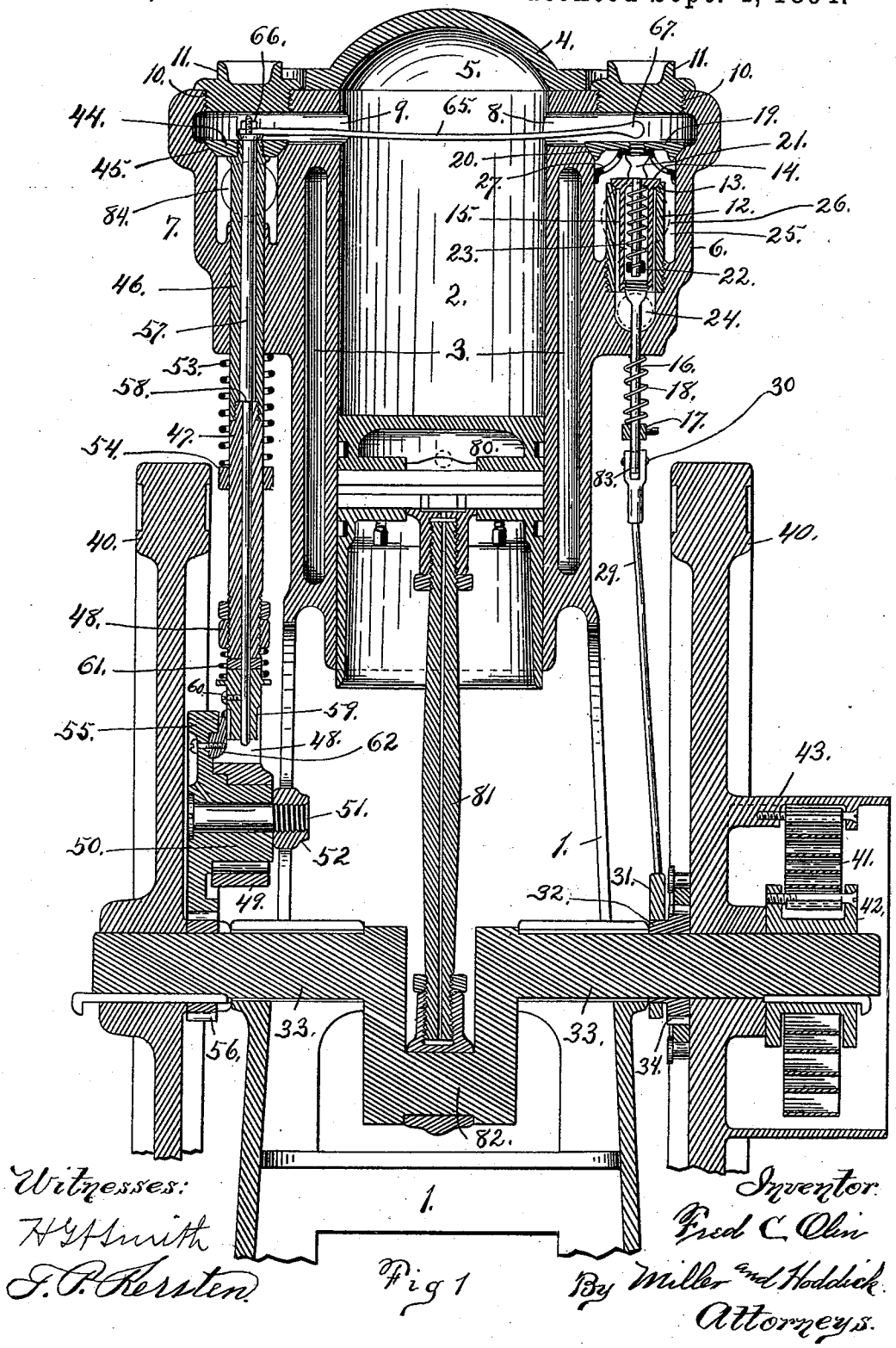
F. C. OLIN.

GAS ENGINE.

No. 525,358 Patented Sept. 4, 1894.



Witnesses:
H. G. Smith
J. P. Kersten.

1.

Fig 1

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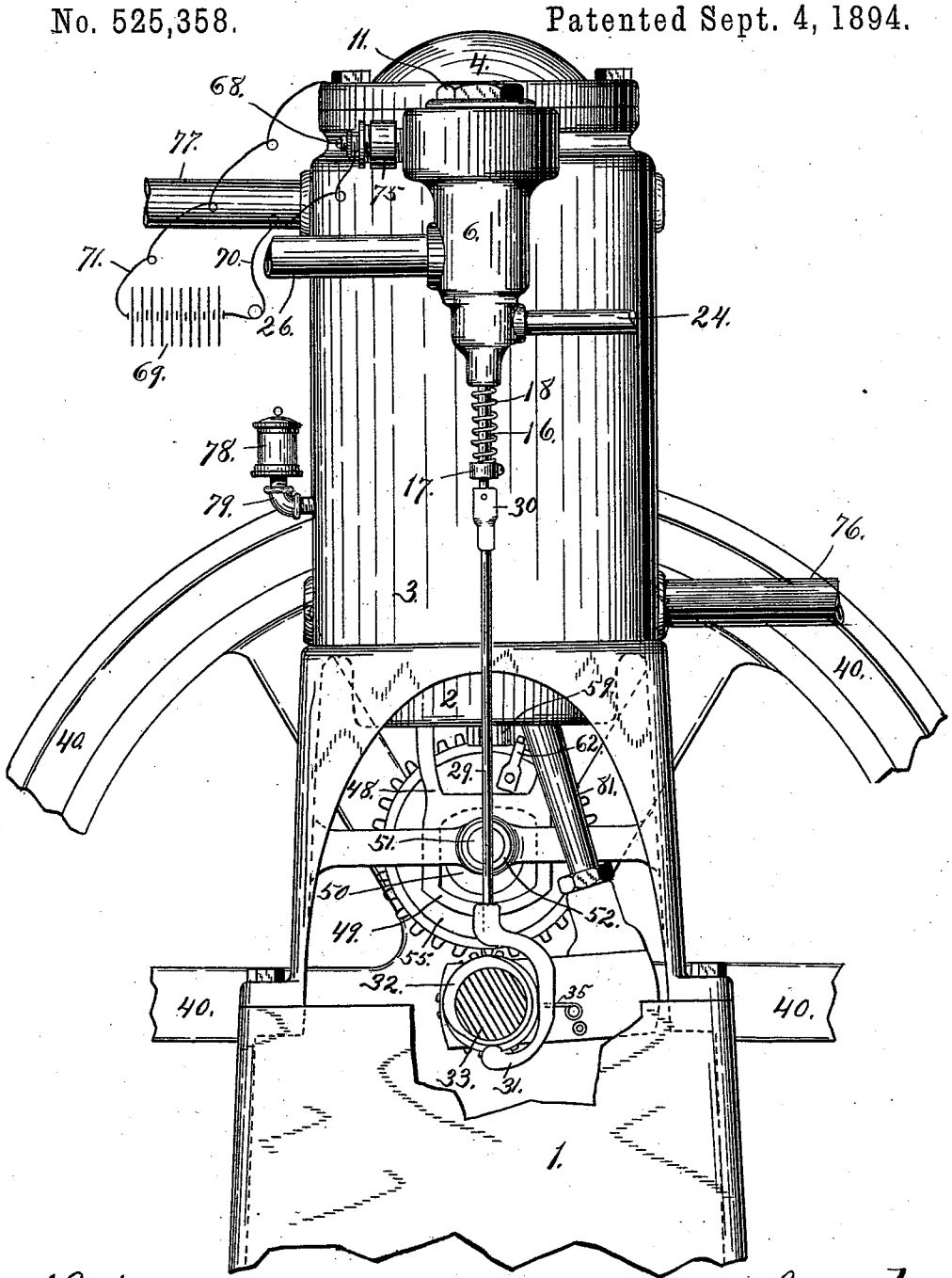

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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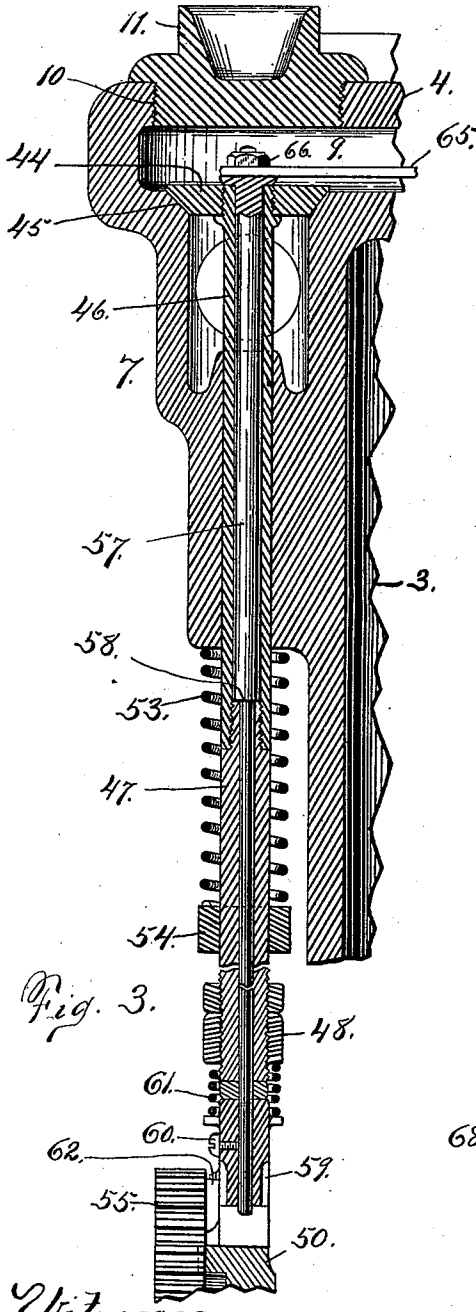

Fig. 3.

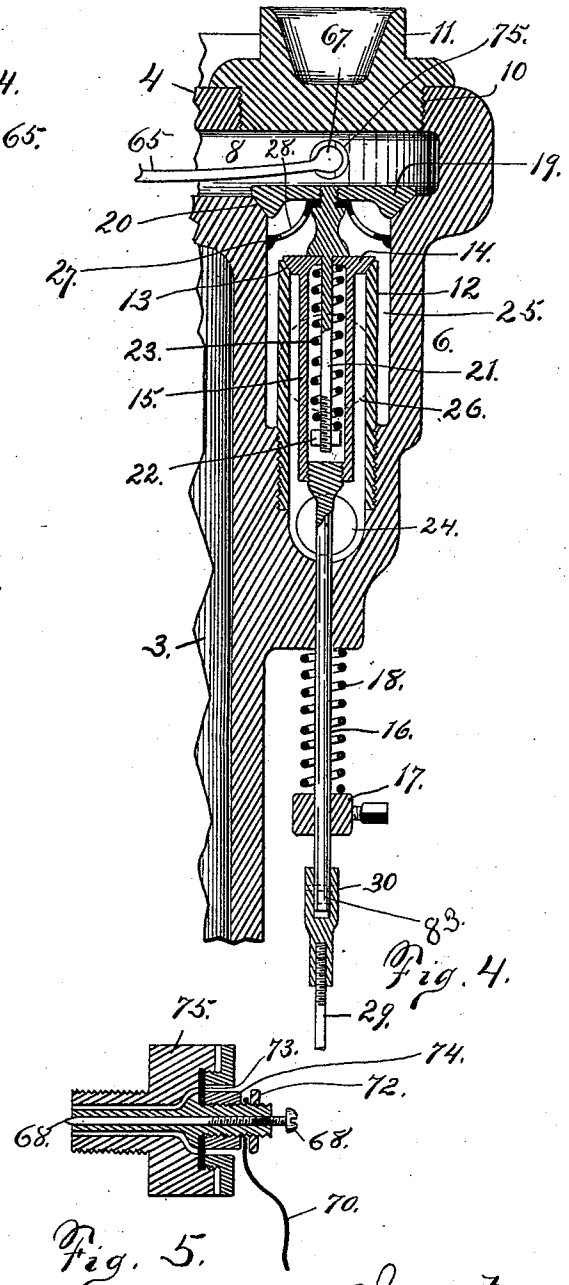

Fig. 4.

Fig. 5.

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GAS ENGINE.

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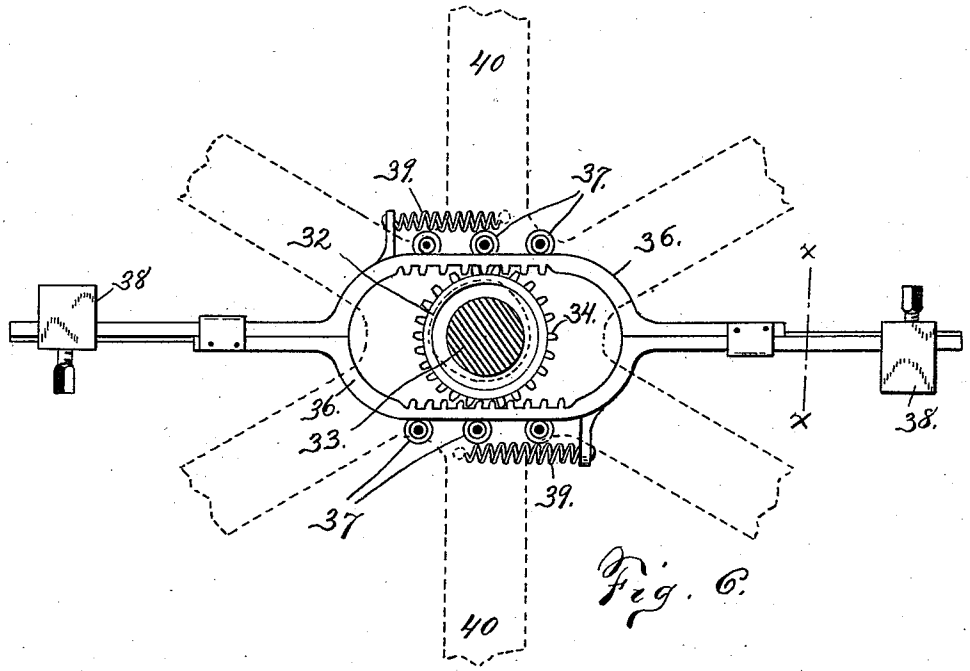

Fig. 6.

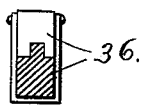

Fig. 7.

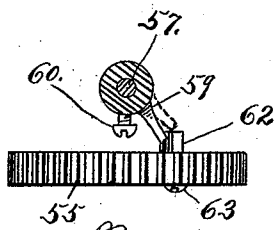

Fig. 9.

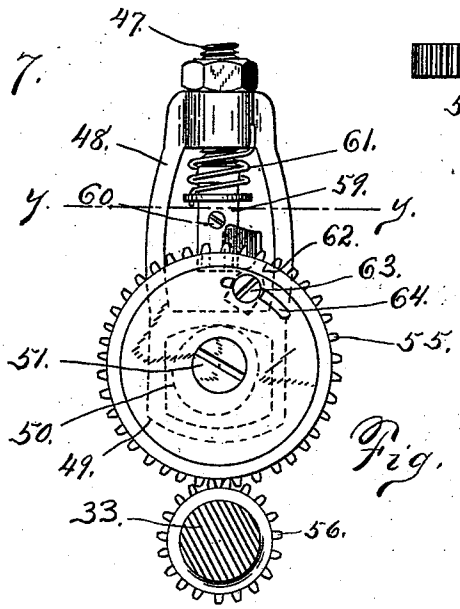

Fig. 8.

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UNITED STATES PATENT OFFICE.

FRED C. OLIN, OF DUNKIRK, NEW YORK.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 525,358, dated September 4, 1894.

Application filed August 26, 1892. Serial No. 444,215. (No model.)

To all whom it may concern:

Be it known that I, FRED C. OLIN, a citizen of the United States, residing at Dunkirk, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Gas-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates more particularly to that class of gas engine in which the motive power is obtained by the expansive action of ignited gases in which the ignition is automatically produced by electricity.

The object of my invention is to produce an engine of the above class in which its speed is automatically regulated, the uniformity of its stroke properly governed, the point of ignition of the gas so placed, and method of affecting it so arranged as to obtain improved results, its lubrication rendered easy and efficient and its parts so arranged as to be convenient of access and compact in form.

To this end my invention consists in a novel arrangement and combination of parts which will be more particularly hereinafter described and pointed out in the claims.

In the drawings before referred to which serve to illustrate my said invention more fully, Figure 1 is a central-vertical section of my improved gas-engine. Fig. 2 is a side elevation of the same with portions broken away to show constructions. Figs. 3 and 4 are detail sectional views showing the arrangement of the supply and exhaust ports with their operating valves respectively. Fig. 5 is a detail view of an electrical igniter employed. Fig. 6 is a detail view of the governor employed. Fig. 7 is a section taken through the line x—x of Fig. 6. Fig. 8 is a detail view showing the cam arrangement for operating the exhaust port and igniting lever, and Fig. 9 is a partial section taken through the line y—y to show the engagement of lever 59 with a cam.

Referring to the drawings: 1 is the body or frame of my improved gas engine having the cylindrical casing or jacket 2 at its upper end provided with an annular chamber 3, for the reception of a cooling liquid. This casing or jacket forms the cylinder for the engine and is closed at its head by the plate 4, having a concave recess 5 surmounting the cylinder 2, (the object of which will be hereinafter more fully described.)

On either side of the cylinder 2 are arranged the supply and exhaust chambers 6 and 7 respectively, and which are connected to the cylinder through the passages 8 and 9 respectively.

The supply port 6, through which the gas and air is admitted to the cylinder is constructed as follows: A screw threaded opening 10 is cut into the top of the casing 6, and covered by the nut or cap 11, this is essential for the initial construction of the valve as well as for the removal of parts when desired. Within the casing 6 is threaded the short tube 12, having the valve seat 13 at its upper edge for the reception of the valve 14. This valve 14 is cast integral with a second tube 15, which rests within the tube 12 and is threaded at its lower end to the valve-stem 16. Outside of the casing 6, and upon the stem 16 is secured the adjustable sleeve or collar 17 against which the spiral spring 18 acts its upper end acting against the casing 6. The action of this spring 18 tends to keep the valve 14 closed. At the upper end of the casing 6 where the gas and air enters, the passage 8, is the valve plate 19 which rests in the seat 20, and has its stem 21 extending through the valve 14 into the tube 15. At the lower end of this stem 21 is threaded the nut 22 against which the spiral spring 23 acts its upper end acting against the valve plate 14, thus tending to keep the valve 19 closed. To insure perfect working of the valves 14 and 19, the spiral spring 23 is adjusted to a higher tension than that of the spring 18. The gas enters the casing 6 at its lower end through the passage 24 from whence it passes up through the tube 12 and is intermittently permitted to pass through the valve 14 entering the chamber 25 where it mixes with air taken into the chamber 25 through a passage

26 shown in Fig. 2, and indicated in dotted lines in Fig. 1.

27 is a light plate secured to the valve plate 19 and serves to guide the valve to and from its seat 20. This plate is provided with the openings 28 for the free passage of the gas and air on its way to the cylinder.

The valve stem 16 is pivotally connected to the connecting rod 29 as shown at 30, the pin resting in an elongated slot 83. This construction permits the valves 14 and 19 to be opened by the suction of the piston except when held down by the action of the cam 32 which draws the pin to the bottom of the slot. The lower end of this connecting rod is secured to a hook shaped bearing 31 acting against the cam 32 as shown, the cam being mounted upon the main shaft 33, of the engine, and the bearing 31 being held up and against such cam by the small spring 35, which is so arranged as to permit the bearing to be raised and lowered by the action of the cam 32. At the right hand side of this cam 32, (see Fig. 1,) and cast integral therewith, is the gear wheel 34, a detail of which is shown in Fig. 6. This gear wheel 34 intermeshes with the rack bars 36 which are held in position by the small flanged rollers 37. The outer ends of these rack bars 36 are dovetailed and strapped together as shown in section Fig. 7, and adjustably secured to the outer ends of each bar are the weights 38. The centrifugal force of these weights causes the bars to slide upon one another turning the gear 34, thus changing the relative position of the cam 32 with its hook-shaped bearing 31, and causing the admission of the gas to be delayed in its passage to the cylinder till later in the suction stroke, thereby diluting the charge in the cylinder but retaining a strong charge in the ignition chamber 8, as the centrifugal force is reduced, the bars 36 with their weights are again returned by the action of the spiral springs 39, to their normal position.

40 are the balance wheels mounted at the ends of the main shaft 33. To one of these balance wheels 40 I have connected an additional balancing device which consists of a stiff coiled spring 41, the inner end of which is secured to the collar 42, which is keyed to the main shaft and its outer end to the annular shell 43, which usually is cast integral with the balance wheel 40. This balance wheel is loosely mounted upon the main shaft 33. The shell 43 might also be employed as a drive pulley.

In the exhaust port on the opposite side of the cylinder, I have arranged the spring pressed valve 44, which is fitted in the valve seat 45. This valve 44 is threaded to the hollow stem 46, which is jointed to a second stem 47, having a smaller bore and forming a shoulder at 58. To this second stem 47, is threaded the yoke shaped casting 48, at the lower end of which is arranged the collar 49 which is fitted over the cam 50. The cam 50 is revolved upon a screw threaded shaft 51 which is threaded into a reinforced portion 52 of the frame.

53 is a spiral spring acting against the casing 7, and collar 54, and serves to hold the valve 44 closed when not acted upon by the cam 50.

To the left of the cam 50, (see Fig. 1,) and cast integral with it, is the gear wheel 55. This gear wheel 55 intermeshes with the pinion 56 mounted upon the main shaft 33, and through which motion is imparted to the cam 50.

57 is a vertical rod used in operating the igniting lever, this rod rests within the hollow stems 46 and 47, being reduced in diameter as it enters the stem 47. This construction permits of a convenient adjustment of the stems 46 and 47, and forms a seat for the shoulder 58, on the rod 57. At the lower end of this rod 57 is secured the short lever 59, by the set screw 60.

61 is a spiral spring secured at its lower end to the lever 59, and at its upper end to the yoke 48. This spring 61 is employed for returning the rod 57 to its normal position after having been slightly revolved by a cam 62, adjustably secured to the inner face of the gear 55 as shown in Fig. 8. The securing screw 63 passing through an elongated slot 64, thereby admitting of an adjustment to time the ignition. At the upper end of this rod 57 is secured the igniting lever 65 by the nut 66. This igniting lever when in its normal position has its end 67 separated from the pin 68, which is secured into the casing 6, and insulated therefrom as shown in detail in Fig. 5. This pin 68 is electrically connected to a pole of the battery 69 by the wire 70, see Fig. 2, and when connection is made between arm 85 and point 68, the electricity passes from battery 69 through wire 70, pin 68, arm 85, body of engine, wire 71, and to battery or vice versa.

In the electrical circuit above described is usually interposed an ordinary spark coil, not shown. It may be stated that a small dynamo run by the engine may be used instead of the batteries. The pin 68 might be arranged in other ways but that shown in Fig. 5 is preferred. The pin 68 being threaded within the sleeve 72, over which a non-conducting disk 73 is secured by the nut 74. This disk is of a stiff material and serves to hold the sleeve 72 with its pin 68, electrically apart from the plug or cap 75, which is threaded into the side of the casing as seen in Fig. 2.

76 and 77 are the inlet and outlet pipes respectively of the cooling chamber 3, through which water is permitted to pass while the engine is in operation.

Oil is fed to the cylinder from the cup, through the pipe 79, where it passes to and into the piston head 80, through wrist pin and is carried down through the center of the connecting rod 81, to the crank shaft 82, in

this manner the cylinder wrist pin and crank of my improved gas engine are lubricated from one oil cup.

The concaved portion 5 forms a chamber at the head of the cylinder and when constructed as shown with a spherical inner surface besides giving increased strength the internal surface of the cylinder is reduced in proportion to its volume, thereby increasing its efficiency.

In operation the cooling chamber 3 is filled with water which is constantly changing through the passages 76 and 77, the balance wheels 40 on the main shaft 33 are then revolved turning the cam 32 which permits the valve plates 14 and 19, to open, admitting the gas and air which is drawn into the cylinder by the descending piston head. After the explosive mixture of gas and air has entered the cylinder through the passage 8, the mixed gases now in the cylinder are compressed by the return stroke of the piston head, the adjustable cam 62 on the gear 55 comes in contact with and slightly turns the small lever 59, and with it the rod 57 at the upper end of which the igniting arm 65 is secured. Now about the beginning of the working stroke this lever 65 is made to come in contact with the pin 68 and immediately separate, causing the electrical current to pass voluntarily through them and break, causing them to arc and thus ignite the gases at this point. I have also found in practice that much better results are obtained by igniting the gases just where they enter the cylinder and before mixing with the consumed gases which may not have passed out through the exhaust port. After the exploded gases have exerted their expansive force upon the piston head the cam 50 causes the valve 44 to open permitting the exhaust gases to escape through the exhaust port 9 and passage 84.

It will be seen that a four cycle operation is thus completed by this engine, *i. e.* drawing in gas and air, compressing them, firing them, and exhausting them.

It is to be observed that the heavy coil spring 41 will tend to wind up on the working stroke and unwind on the three succeeding strokes thus giving the piston a fast working stroke which tends to economical working, and also to reduce the jar of the explosion.

I claim—

1. In the herein described gas-engine having the usual cylinder, piston-head, connecting-rod and crank-shaft, the valves for the admission of gas and air into the cylinder, a tubular exhaust valve stem and an automatic electrical igniter consisting of an insulated electrode, an oscillating arm secured to the upper end of a vertical rod extending from the upper face of the exhaust valve, through the stem of the exhaust valve and operated by a cam or projection upon the gear mounted upon the side of the frame all combined and operating substantially as shown and described.

2. In a gas engine having the usual cylinder, piston-head, connecting-rod and crank-shaft, the combination with a mixing chamber arranged upon the cylinder and provided with valves for intermittently admitting gas and air of a governor, attached to the side of a disk or fly-wheel, for regulating and equalizing the supply of gas to the cylinder consisting essentially of two reciprocating rack-bars, sliding upon opposite sides of and engaging with a gear cast or made integral with the cam employed for regulating the supply of gas to the cylinder, said rack-bars being movably attached to the side of the balance-wheel and operated by the centrifugal force of the weights thereof substantially as shown and described.

3. The herein described gas engine consisting essentially of the frame 1, cylinder 2, with cooling chamber 3, having inlet and outlet passages 76 and 77, the supply port 6, having gas passage 23 and air passage 26 through which gas and air is admitted to the cylinder through the adjustable spring pressed valves 13 and 19, an igniter consisting of the adjustable cam 62 pressing the lever 59 on the vertical rod 57, causing the reciprocating arm 65 to have intermittent contact with the insolated pin 68, and the exhaust port 7, being provided with the valve 44, connected by the stem 46. 47 to the operating cam 50, the whole arranged and operating substantially as shown and described.

4. In a gas engine the gas and air inlet valve 19 having the spring-pressed stem 21 and the gas-inlet valve 14 having stem 16 both arranged within the casing 6, having gas supply passage 24, and air supply passage 26, the spring pressed stem 16, being adjustably pivoted to the rod 29, the rod 29 being connected to the hook-shaped bearing 31 acted upon by the cam 32 upon the shaft 33, all combined and operating substantially as and for the purpose stated.

5. In a gas engine the exhaust valve 44 having a hollow spring-pressed stem consisting of the tubes 46 and 47, the collar 49, secured to the lower end of said stem and fitted over and operated by the cam 50, the igniting lever 65 secured to the vertical rod 57 which passes through the hollow tubes 46 and 47, the rod 47 being provided with the shoulder 58, which engages with the upper end of the tube 47 for the purpose stated, and a short lever 59 secured to the lower end of said rod and operated by a cam 62 secured to the gear 65, all combined and operating as and for the purpose stated.

6. In a gas engine the exhaust valve 44 having a hollow spring pressed stem the collar 49 secured to the lower end of said stem and fitted over and operated by the cam 50, the igniting lever 65 secured to the vertical rod 57 which passes through the hollow stem,

the rod 47 being provided with the shoulder 58 which engages with the upper end of the tube 47 for the purpose stated and a short lever 59 secured to the lower end of said rod and operated by a cam 62 secured to the gear 65 all combined and operating as and for the purpose stated.

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

FRED C. OLIN.

Witnesses:
NILES C. BARTHOLOMEW,
CATHARINE B. M. OLIN.