C. T. LAUGHTON.

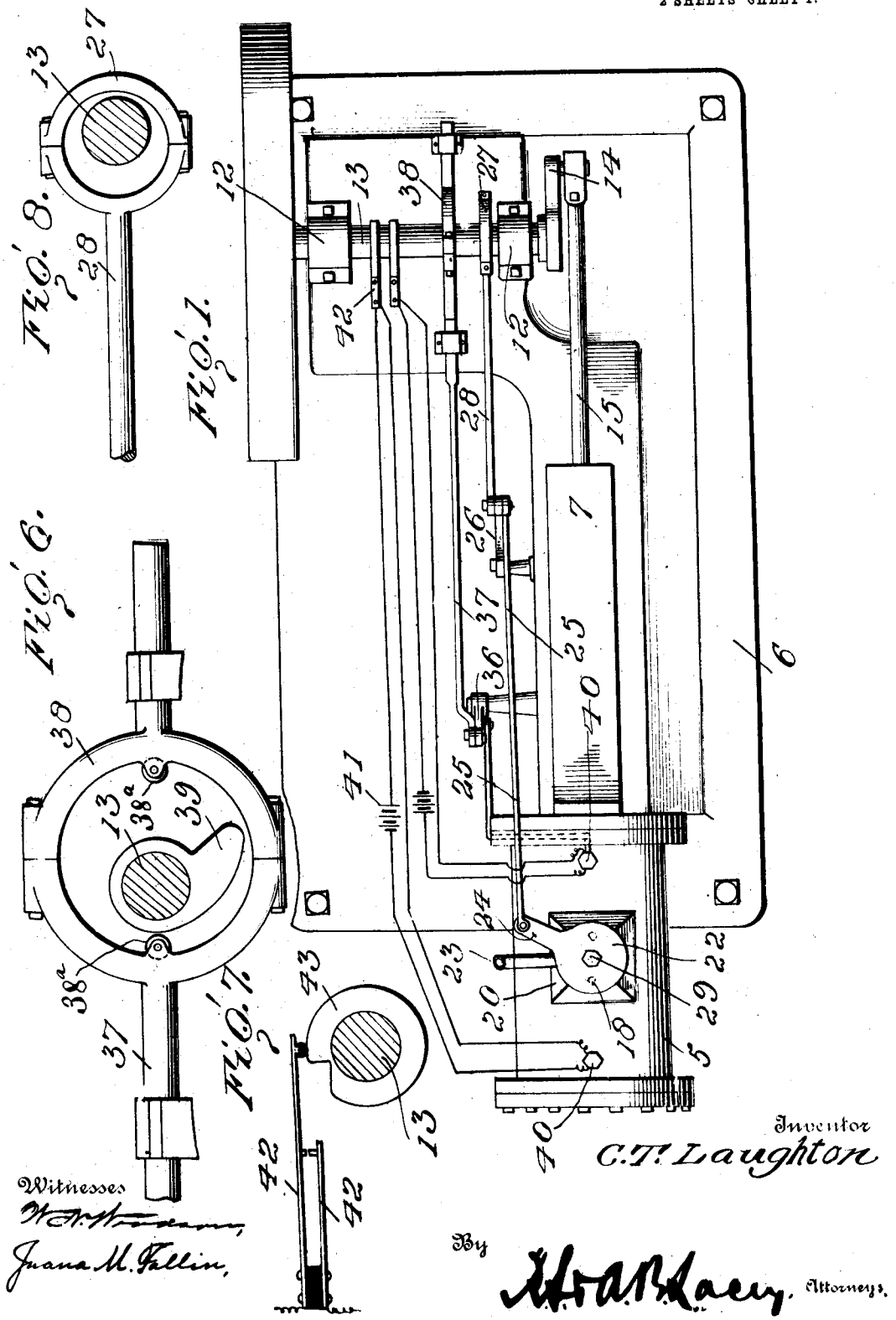
ENGINE.

APPLICATION FILED JAN. 7, 1910.

1,066,740.

Patented July 8, 1913.

2 SHEETS—SHEET 1.



Witnesses

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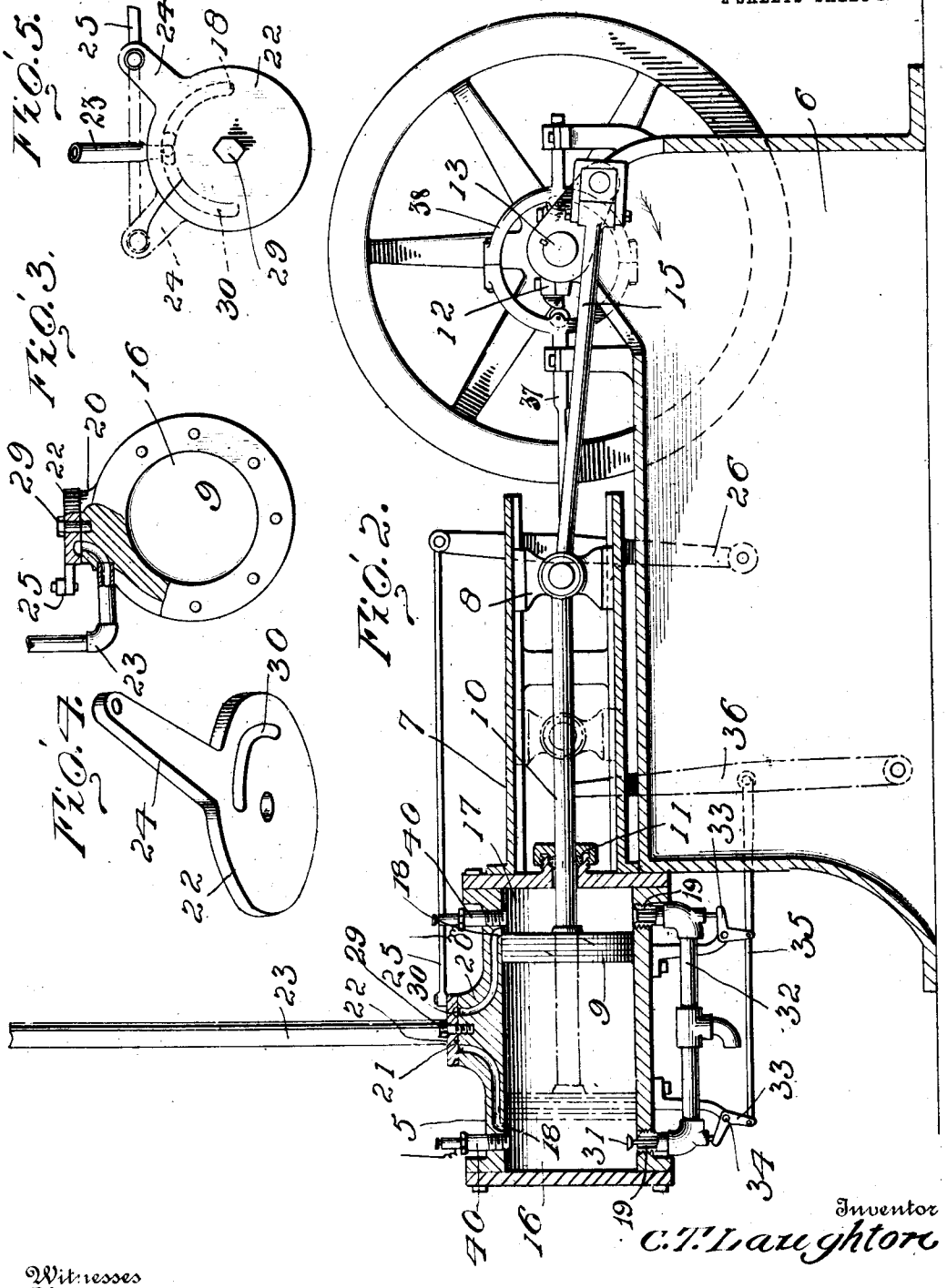
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Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES T. LAUGHTON, OF GUYMON, OKLAHOMA.

ENGINE.

1,066,740. Specification of Letters Patent. Patented July 8, 1913.

Application filed January 7, 1910. Serial No. 536,935.

To all whom it may concern:

Be it known that I, CHARLES T. LAUGHTON, citizen of the United States, residing at Guymon, in the county of Texas and State of Oklahoma, have invented certain new and useful Improvements in Engines, of which the following is a specification.

This invention relates to gas engines and has for its object the provision of an internal combustion engine of simple and compact construction capable of developing maximum power with a minimum consumption of fuel.

A further object is to provide a gas engine in which the movement of the piston is effected by alternate explosions at the opposite ends of the cylinder.

A further object is to provide a novel form of valve for controlling the admission of fuel alternately to the combustion chambers.

A still further object of the invention is generally to improve this class of devices so as to increase their utility, durability and efficiency.

Further objects and advantages will appear in the following description, it being understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claim.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a top plan view of a gas engine constructed in accordance with my invention; Fig. 2 is a vertical sectional view of the same partly in elevation; Fig. 3 is an end view partly in section of the cylinder; Fig. 4 is a detail perspective view of the valve detached; Fig. 5 is a top plan view of the valve showing the range of movement of the latter; Fig. 6 is a side elevation of a portion of the cam for actuating the exhaust valves; Fig. 7 is a side elevation of one pair of contact plates for the sparking devices; Fig. 8 is a side elevation partly in section of the eccentric for operating the inlet valve.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The gas engine forming the subject matter of the present invention comprises a cylinder 5 mounted on a suitable supporting base 6 and provided with spaced guides 7 in which is slidably mounted a reciprocating cross head 8. Slidably mounted in the cylinder 5 is a follower or piston 9, the rod 10 of which passes through a suitable gland 11 for connection with the cross head 8. Journaled in bearings 12 on one end of the supporting base 6, is a driving shaft 13 having a terminal crank arm 14, the latter being connected through the medium of a pitman 15 with the cross head 8, as shown. The cylinder 5 is provided with oppositely disposed combustion chambers 16 and 17, each provided with an inlet port 18 and an exhaust port 19. The inlet ports 18 open through the top of an enlargement 20 formed on the upper portion of the cylinder, the latter being provided with a flat bearing surface 21 constituting a seat for a flat oscillating or disk valve 22. A fuel supply pipe 23 is connected at one side of the enlargement 20 and also opens through the top of said enlargement, preferably at a point intermediate the inlet ports 18. The valve 22 is provided with a laterally extending arm 24 to which is pivotally connected one end of a rod 25, the opposite end of which is pivotally connected with a rocker arm 26 mounted on the base 6. The arm 26 is oscillated to effect the movement of the valve 22 by means of an eccentric 27 mounted on the driving shaft 13 and connected through the medium of a rod 28 with the intermediate portion of the rocker arm 26, as shown. The valve 22 is pivotally mounted at 29 on the valve seat 21 and is provided with a segmental or blind slot or channel 30 adapted to register with the inlet ports of each combustion chamber for the purpose of admitting gas or other fluid alternately to said chambers. The channel or slot 30 is of such a length and is so disposed with respect to the pivot pin 29 as to be in constant communication with the feed port or discharge of the pipe 23 and thus afford a source of communication between the supply pipe 23 and one of the inlet ports 18, while the other inlet port 18 is closed, thus to permit the explosion of the fuel in one combustion chamber and the exhaust of the products of combustion from the other and vice versa. The valve 22 is thus subjected to

a constant upward pressure and undue friction thereby prevented between the valve and its seat.

Slidably mounted in the exhaust ports 19 are valves 31, the stems of which project through the elbows of a connecting pipe 32 for engagement with suitable bell crank levers 33 pivotally mounted at 34 on a bracket or extension depending from the cylinder. The lower arms of the bell crank levers 33 are connected by a short rod 35, which is in turn pivotally connected with a rocker arm 36 carried by the supporting base. The arm 36 is actuated to alternately open and close the exhaust valves 31 by means of a rod 37 having a ring or yoke 38, which latter surrounds the driving shaft 13 and is reciprocated by a suitable cam 39 thereon.

Projecting within the combustion chambers 16 and 17 are spark plugs 40, each connected in a circuit including a battery 41 and spaced contacts 42. The contacts 42 are actuated by a cam or projection 43 on the driving shaft 13 to make and break the circuit and thus alternately ignite the fuel in the combustion chambers 16 and 17.

It is to be noted with regard to the valve 22 and the eccentric 27 that, while the eccentric 27 gives a continuous motion to the rod 28 and hence to the valve 22, the recess 30 is so disposed that there is a considerable period of travel for the valve plate 22 before the end of the recess 30 reaches one inlet port after leaving the other inlet port. Thus during the greater portion of the travel of the piston neither of the inlet ports is open. These ports are designed to be opened alternately and during the first part of the movement of the piston away from the opened port and toward the closed port.

The means for reciprocating the rod 37 whereby the exhaust valves are operated is also formed to provide for the actuation of the exhaust valves near the extremities of the piston travel, leaving the valves in their open position during the greater portion of the piston stroke. These valves also are intended to operate alternately and to open and close when the piston is near the ends of the cylinder. One exhaust valve closes while the other exhaust valve opens as the piston moves away from the first named exhaust valve, and the valves remain in this position until the piston nears the opposite end of the cylinder when the first valve opens and the second valve closes. This movement of the exhaust valves is secured by constructing the cam 39 and the cam ring 38 as illustrated in Fig. 6. The cam ring 38 is larger in diameter than the length of the cam 39. Thus the cam will revolve within the cam ring without touching the ring. The ring is provided, however, at opposite points in its diameter with the anti-friction rollers 38^a which project into the path of movement of the cam 39. The cam 39 for a greater portion of its active face is concentric to the shaft 13. As a consequence, the shaft 37 will remain in its last shifted position during a portion of the revolution of the shaft 13 and until one of the rollers 38^a engages with the inside face of the cam, whereupon the rod 37 will be moved outward until the roller 38^a passes the apex of the cam when it will remain in this position until the cam engages the opposite roller. This provides for an alternate shifting of the rod 37 in one direction and the other with a rest between these reciprocations. The movement of the rod is not continuous, in other words, but is intermittent.

The eccentric 27, the cam 39 and the crank 14 are so set relatively to each other that during the first portion of the first quarter revolution of the crank arm 15 (in the direction of the arrow, Fig. 2) the valve 22 will be oscillated so as to cause the extremity of the slot 30 to register with the inlet port of the forward combustion chamber and connect it with the supply pipe 23, thereby admitting fuel to said combustion chamber. As the piston moves rearward, the exhaust valve will close, the inlet valve still remaining open. At the completion of the quarter stroke in the direction of the arrow, Fig. 2, the valve 22 will have traveled rearward a sufficient distance to cut off communication between the supply pipe 23 and the inlet port of the forward combustion chamber. While the piston is moving through the first quarter of its travel, as above indicated, the exhaust valve in the rear end of the chamber is opened, though the inlet port to this end of the chamber remains closed. After the inlet port in the forward chamber has closed, the charge is ignited, driving the piston rearward. While the piston is moving rearward, the valve 22 is also traveling rearward, and when the piston has reached its rearmost position the extremity of the slot 30 registers with the inlet port in the rear chamber and a fuel charge enters said rear chamber. As the piston moves forward it sucks in the charge and after the exhaust gases have passed out, the exhaust valve in that end of the chamber is closed as before stated, then the inlet valve is closed and the charge in the rear chamber fired to drive the piston forward.

It will be seen that by using the rocker arms 26 and 36, I can secure any desired relative movement between the rods 28 and 35 and the piston rod.

Having thus described the invention, what is claimed as new is:

A double acting internal combustion engine comprising a cylinder provided at its side with an enlargement, inlet ports lead-

ing from the face of the enlargement to the interior of the cylinder in the vicinity of the opposite ends thereof, a fuel supply port terminating at the face of the said enlargement and located midway between the ends of the said inlet ports, a pivot mounted upon the enlargement, the ends of said inlet ports being located at equal distance from said pivot, a valve mounted upon the pivot and having in its under face a curved channel concentrically arranged and being of a length greater than the distance between each inlet port and the said fuel supply port, means for moving the valve to establish communication through the channel between each inlet port and the fuel supply port alternately and a piston movably mounted in the cylinder.

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

CHARLES T. LAUGHTON. [L. S.]

Witnesses:
N. E. NANCE,
E. C. LANGSTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."