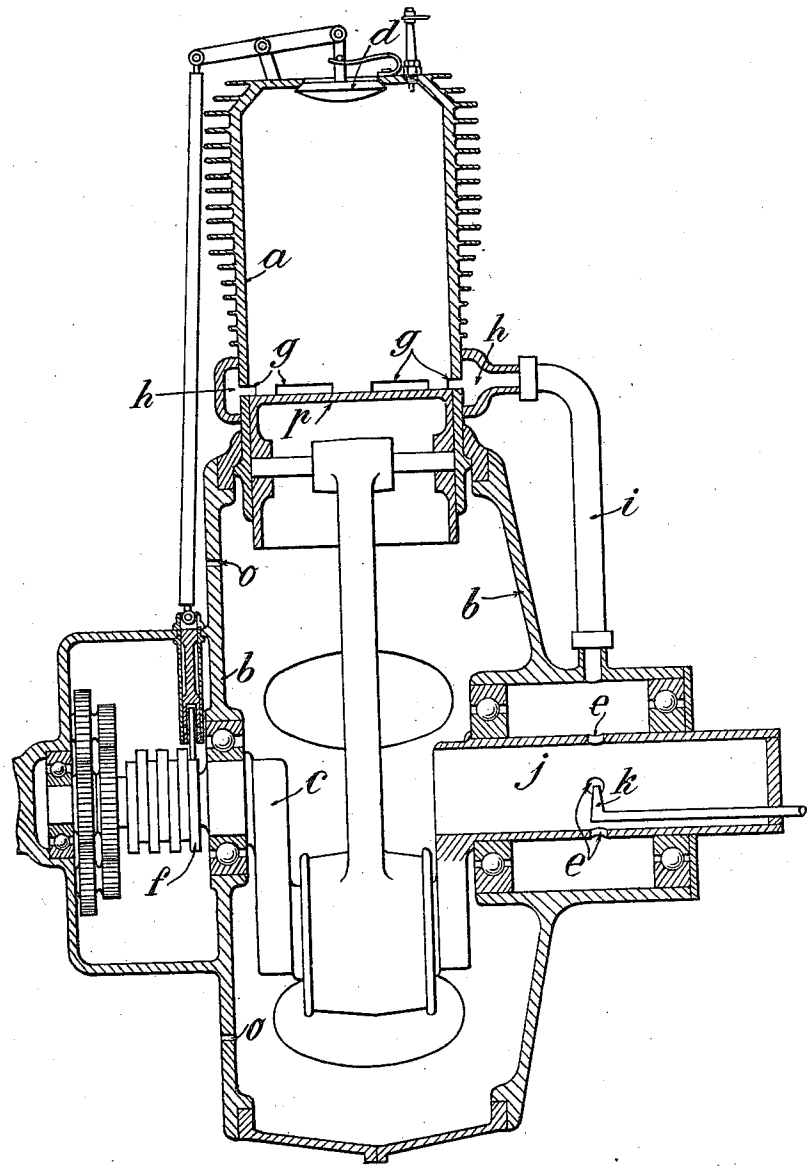
L. L. A. SEGUIN.

FOUR-CYCLE EXPLOSION ENGINE.

APPLICATION FILED JULY 1, 1913.

1,267,128.

Patented May 21, 1918.



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FOUR-CYCLE EXPLOSION-ENGINE.

1,267,128. Specification of Letters Patent. Patented May 21, 1918.

Application filed July 1, 1913. Serial No. 776,779.

To all whom it may concern:

Be it known that I, LOUIS LAZARE AUGUSTE SEGUIN, citizen of the Republic of France, residing at 3 Rue La Boëtie, Paris, in the Republic of France, have invented new and useful Improvements in Four-Cycle Explosion-Engines, of which the following is a specification.

This invention relates to valve mechanisms for four cycle explosion motors, in which the distribution is assured by a single outlet valve operated mechanically and situated in the cylinder head, and by simple openings or admission ports made in the wall of the cylinder toward its other extremity and which the piston uncovers at the required moment to allow the admission of the explosive mixture into the cylinder. There is great advantage in employing valve mechanisms of this type by reason of the extreme simplicity of the mechanism resulting principally from the absence of any valve or of any movable distributer for the admission. But the great inconvenience of these systems arises from the fact that toward the end of the explosion stroke and at the moment when the piston uncovers the openings or ports of the cylinder, there is communication between the ignited gases which are still in the cylinder (even if one has effected an advance of the exhaust) and the explosive mixture which is in the admission conduit; there results back firing or undesirable ignitions in the admission conduits, which makes the system in this simplified form without great practical value. It has consequently been necessary to employ movable devices which at the desired moment close the cylinder orifices or ports and prevent communication between the ignited gases and the explosive mixture in the admission conduit. These devices have, as can be understood, the inconvenience of complicating the mechanism and consequently oppose the result sought for when adopting a valve mechanism without admission valve.

This invention has for its object an improved system of distribution for four cycle motors which allows of employing a very simple construction comprising a single governed valve, placed at one of the ends of the cylinder and openings or ports formed in the wall of the cylinder toward its other extremity so as to be capable of being uncovered by the piston at the end of its stroke, the said system further allowing of dispensing with the employment of any movable obturator for preventing the return of the flame while however rendering the production of these returns of flame impossible.

This system of distribution consists on the one hand in leaving the actuated valve arranged in the cylinder head open not only during the whole period of exhaust, but also during the greater part of the suction stroke, which assures during this part of the suction stroke, the entrance into the cylinder through this valve of almost the total amount of pure air which is necessary for the formation of the explosive mixture in the cylinder, and on the other hand to form in a chamber or outlet of the admission conduit (which chamber may be the motor casing) an extremely rich gas, by means of atomized fuel, this gas being by reason of its richness absolutely inexplosive and uninflammable. This rich gas passes into the cylinder toward the end of the suction stroke, at the moment when the piston uncovers the orifices or ports of the cylinder, and by mixing with the pure air which already fills the cylinder, as has been described, it carburates the said air and forms the explosive mixture; the piston during the following stroke will compress the said mixture which will as usual be ignited at the end of the compression stroke.

To assure the entrance of the rich gas into cylinder, it is sufficient to close the actuated valve which allows the pure air to enter, before the piston reaches the ports made in the cylinder wall so that during part of the stroke occurring between the time of closure of the valve and the opening of the ports of the cylinder, the piston causes a slight suction in the cylinder sufficient to suck said rich gas through the ports of the cylinder directly they are uncovered.

It is necessary to remark that with such system not only is a sure operation without return of flame obtained with an extremely simple construction, but further that it is only necessary to give the ports of the cylinder a very small height, since instead of all the mixture for the cylinder passing through these ports it is only necessary for the very rich gas to pass through, that is

to say, for a small part of the charge, consequently there is no fear that these orifices will cause leaks around the piston at the moment when the segments or tightening members of the piston pass in front of them, as might occur if these orifices had a great height, which was the case when the entire admission was effected, through said orifices. Further the single valve remaining open during nearly all the suction stroke there is not any vacuum in the cylinder and consequently not any negative work during almost the whole of this stroke, and further, during this same part of the stroke, the valve, the cylinder head and the piston, that is to say all the parts heated during the explosion, expansion and exhaust are greatly cooled by the entrance of the fresh air.

In the annexed drawing is represented by way of example a motor to which is applied a system of distribution according to the invention. By way of example there is shown a motor of the type in which a casing having cylinders fixed radially thereto rotates, while the crank shaft is fixed. One cylinder only is illustrated.

The cylinder *a* is fixed on the casing *b* and the whole rotates around the fixed crank shaft *c* while the piston *p* is connected by a rod to the crank pin of said crank shaft.

At the end of the cylinder *a* is arranged the single valve *d* driven mechanically by means of lever mechanism operated by a cam *f* rotating at a speed which is half the speed of rotation of the motor.

The cam is notched in such a manner that the valve *d* opens before the end of the driving or expansion stroke which produces the advance of the exhaust and remains open not only during the whole exhaust stroke but also during the greater part of the suction stroke, for example during four fifths of this cycle.

Further the cylinder has at its other extremity openings, orifices or ports *g* made in its wall and which communicate with a crown *h* permanently connected by a tube *i* with a chamber such as *j* in which is a fuel nozzle *k* fed by a fuel reservoir placed at a higher level than said nozzle, so that the fuel tends constantly to flow through said nozzle. The chamber *j* communicates also with the atmosphere by very small orifices so that the quantity of air which passes into this chamber at each suction stroke of the motor is very small and altogether insufficient to form an explosive mixture with the quantity of fuel passing into the same chamber; it serves only to atomize the liquid fuel and it is the product resulting from this atomization which is hereinabove termed the rich gas.

In the example illustrated, the chamber *j* into which the nozzle passes is formed by the hollow part of the crank shaft which is closed at one end and communicates at the other with the casing itself, the latter being provided on one of its faces with small orifices *o* for the entrance of the small quantity of air required. The atomized fuel passes to the crown *h* through the holes *e* and the tube *i*.

Before the end of each driving stroke the valve *d* opens and the exhaust commences so that the pressure drops in the cylinder and is not very high when the piston arriving at the end of its stroke uncovers the ports *g*, but this pressure being still greater than that which exists in the crown *h*, a part of the burnt gases pass into the said crown; this causes no inconvenience since as has been said the rich gas which fills the crown is much too rich to be ignited; on the contrary the mixture with the rich gas of a part of the still very hot exhaust gases has the advantage of stirring and re-heating the rich gas and rendering it more homogeneous. The piston then rises driving out the burnt gases through the valve, it being the exhaust stroke.

The piston redescends for the suction stroke; the valve remaining open for about four fifths of the stroke, a corresponding amount of pure air passes into the cylinder. The valve closes and as the ports *g* are still closed, a certain suction is produced, so that when the piston passes in front of said ports and uncovers them the rich gas rushes into the cylinder through these orifices and mixes with the pure air which is there in readiness to form the explosive mixture.

As soon as the piston in rising has closed the ports *g* the compression commences. At the end of the compression the mixture is fired a fresh driving stroke commences and so on.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A rotary internal combustion engine including in combination, a rotary casing, a plurality of radially arranged cylinders carried thereby, a piston for each cylinder, an exhaust valve for each cylinder located at the outer end thereof, an intake port located adjacent the inner end of the stroke of the piston and adapted to be uncovered by said piston, and means for operating said exhaust valve, said operating means being constructed and timed so that said valve is opened allowing the burnt gases to escape and is held open during the first part of the intake stroke whereby fresh air will enter the cylinder so that when the intake port is uncovered by the piston the fuel gases will enter and form with the fresh air a proper mixture for exploding.

2. In a four cycle explosion motor, a cylinder, a piston working in said cylinder, the

cylinder having in its wall openings which are uncovered by the piston at the end of its inward stroke, a chamber in which is formed a carbureted mixture sufficiently rich to be uninflammable, means for forming in said chamber the said carbureted mixture, means for leading to the cylinder openings the said carbureted mixture, an exhaust valve on the cylinder opening into the atmosphere, means for opening said exhaust valve before the end of the working stroke of the piston and closing the same during the next suction stroke before the piston uncovers the cylinder openings, and means for firing the explosive charge in the cylinder, substantially as described and for the purpose set forth.

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

LOUIS LAZARE AUGUSTE SEGUIN.

Witnesses:
ANTOINE LAVOIX,
LUCIEN MEMMINGER.