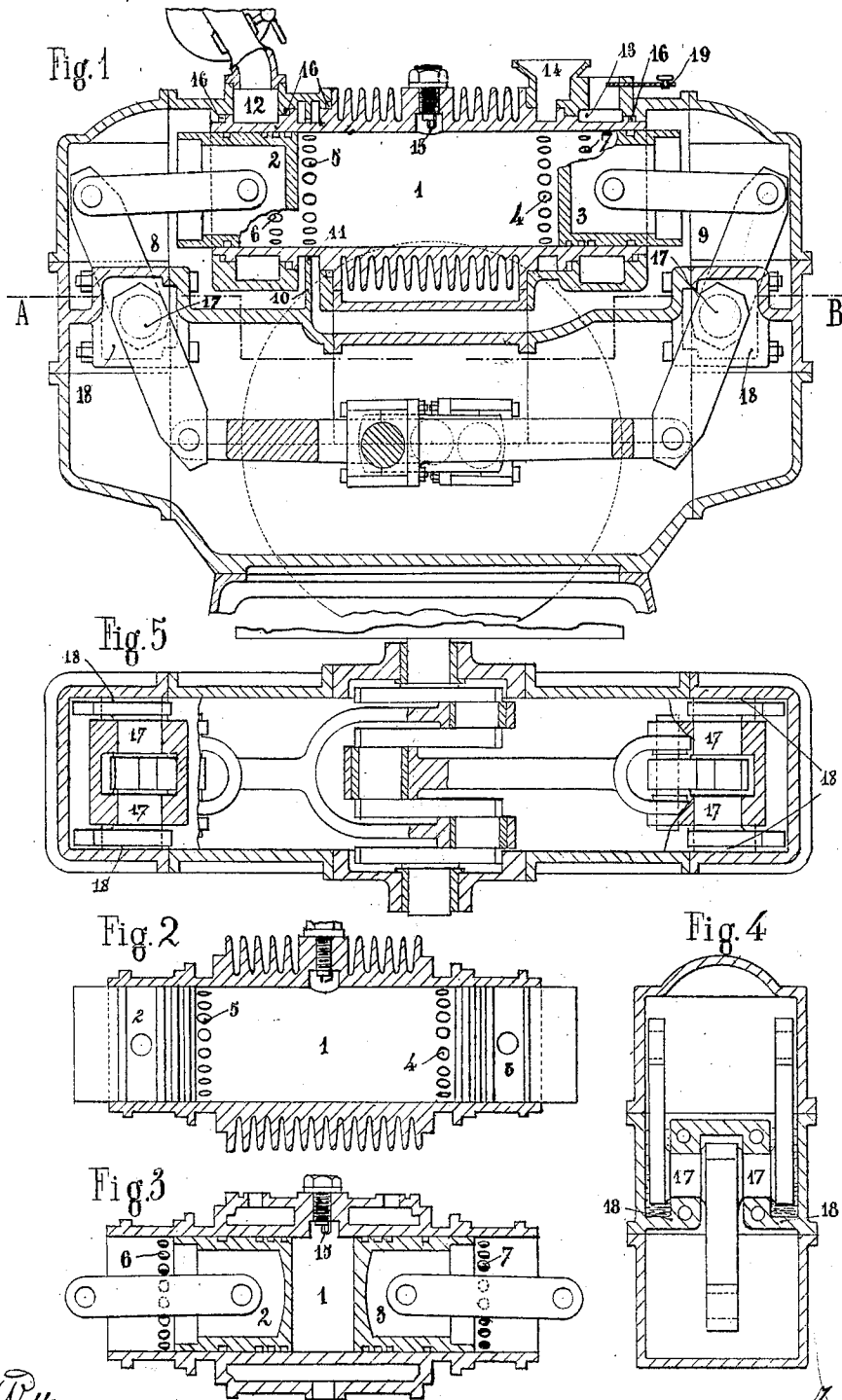


L. E. LEMPERIÈRE.
VALVELESS INTERNAL COMBUSTION ENGINE.
APPLICATION FILED NOV. 8, 1906.

932,419.

Patented Aug. 24, 1909.



Witnesses:
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LÉON EMILE LEMPERIÈRE, OF LA ROCHE, FRANCE.

VALVELESS INTERNAL-COMBUSTION ENGINE.

932,419.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed November 8, 1906. Serial No. 342,569.

To all whom it may concern:

Be it known that I, LÉON EMILE LEMPERIÈRE, a citizen of the French Republic, and resident of La Roche s/Yon, France, have invented certain new and useful Improvements in Valveless Internal-Combustion Engines, of which the following is a specification.—

This invention relates to internal combustion engines the pistons of which serve as distributing organs.

In the accompanying drawings the invention is shown by way of example.

Figure 1 is a vertical longitudinal section of the engine, the piston being partly shown in order to render visible the orifices to be uncovered by them. Figs. 2 and 3 represent sections through the cylinder with the pistons which are represented in the extreme inner and outer positions respectively; in Fig. 3 instead of the cooling ribs, a water jacket is shown. Fig. 4 represents a vertical section through the axis of the working-beam which, being provided at both sides of the engine, transfers the energy of the pistons to suitable shafts. Fig. 5 is a longitudinal section on line A—B (Fig. 1) showing the arrangement for transmitting the movement.

The engine which is two-stroke cycle engine, consists of a cylinder 1, in which two pistons 2 and 3 are adapted to move in opposite directions. Near each end of cylinder 1 are provided two rows of openings 6, 5 and 4, 7 all of same size, destined to be uncovered by the pistons in a given moment. The cylinder is surrounded at both ends by a mantle which, establishing a suitable communication between the openings, forms at the left hand side a gas chamber 8 and at the right hand side an air-chamber 9. The two pistons act simultaneously as driving organs with their inner surfaces and as suction-pumps with their outer surfaces. The piston 2 operates as gas-pump with chamber 8 and piston 3 operates as air pump with chamber 9, said chambers being separated by a partition wall 10 and communicate through slot 11 arranged near the openings 5 between said wall and the cylinder.

The engine operates as follows: Suppose the pistons are at their inner dead-point position (Fig. 3), in which case they will have increased the total space of chambers 8, 9 and consequently produced a reduction of pressure in the two pumps. At this

moment piston 2 uncovers the openings 6 and the piston 3 uncovers the openings 7 whereby on the one hand a determined quantity of gas is drawn through the openings 6 into chamber 8, and on the other hand a determined quantity of air is sucked through the openings 7 into chamber 9. All openings 6, 5 4, 7 are of equal size, but the quantities of air and gas are different. The gas is supplied by any suitable exterior organs (for instance a carbureter) serving for making it denser and for regulating the passage of the entrance, while the quantity of air is regulated by a suitable device 19. Consequently the action of suction can be regulated by operating said device 19 in such a manner that the quantity of air entered is slightly larger than the quantity of gas, wherefrom results that at the place where the chambers are separated that is to say where the passage 11 surrounds the openings 5, the gas coming from chamber 8 is somewhat pressed back by the air coming from chamber 9. The openings 6 and 7 and closed by the pistons in their return movement, and at the same time the total space of chambers 8 and 9 is decreased whereby the highest possible pressure is established within the two pumps. When the pistons reach their outer dead-point position (Fig. 2) piston 3 will first uncover the openings 4 whereby the atmospheric pressure in the cylinder is established; thereafter piston 2 will uncover openings 5, and owing to the over-pressure, the two pumps will press simultaneously, the one air and the other gas, into the cylinder; air and gas will intimately mix. This mixture, preceded by a layer of pure air, being the result of the regulating operation hereinbefore described, gets through the inlet-openings 5 into the cylinder and drives out through outlet-openings 4 and exhaust 14 the gases of the preceding combustion. During the compression which now follows, that is while the two pistons move toward one another, the fresh charge is compressed until the explosion is effected by the spark produced at 15, as soon as the pistons arrive at the inner dead-point position. The pistons driven back by the explosion exert their energy and the cycle begins anew.

The construction described by way of example, is destined for a high-speed engine; cylinder 1 is made in one piece and the openings 4, 6, 5, 7 are cut out at the proper place.

The cylinder is mounted in the casing by means of elastic joints 16.

It is of importance to prevent, between the chambers 8 and 9 and in the lower chamber inclosing the working-beam, the gas and the air from escaping. This is obtained by adopting a working-beam of three arms shown in Fig. 4. In the cavities 18 there is a sufficient quantity of oil found in consequence of a continued lubricating. If there is any wear-off, oil may escape around the shaft 17, but prevents gas and air from escaping. Furthermore the particular working-beam allows an easy taking to pieces of the engine and greatly facilitates the removal of the pistons.

What I claim and desire to secure by Letters Patent, is:

A two-cycle internal combustion engine comprising in combination a cylinder open at both ends, two oppositely disposed pistons of equal size adapted to move therein, mantles inclosing the ends of the cylinder and forming therewith an air compression chamber and a gas compression chamber

respectively, said cylinder being provided near each end with two series of openings controlled by the pistons, the two outer series adapted to admit air and gas respectively to the compression chambers, and the two inner series serving, the one as an exhaust and the other as an inlet to the cylinder, means of communication between the cylinder inlet openings and both compression chambers, working beams connected with said pistons and adapted to work partly within the compression chambers, the bearings for said working beams within the compression chambers being covered by an oil bath whereby the leakage of air or gas from said chambers is prevented, and a crank shaft connected with said working beams, substantially as described and shown and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LÉON EMILE LEMPERIÈRE.

Witnesses:

YVES LE MEIGNEN,
S. O. ALLEYNE.