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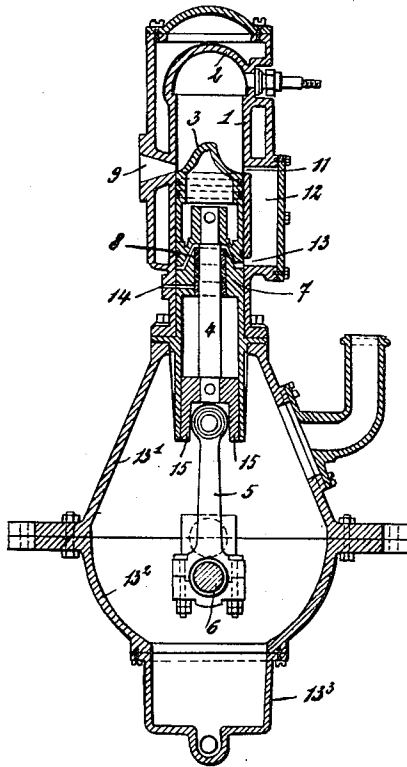
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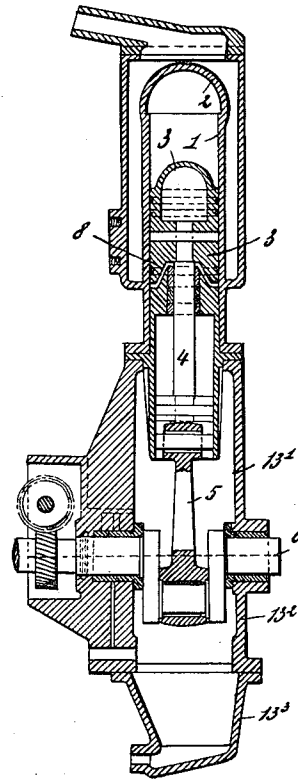
TWO-STROKE EXPLOSION VALVELESS ENGINE

Filed Nov. 11, 1920

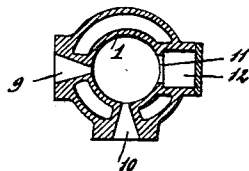
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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## UNITED STATES PATENT OFFICE.

JULES COSTILLE AND GUILLAUME ROBBE, OF BRUSSELS, BELGIUM.

## TWO-STROKE EXPLOSION VALVELESS ENGINE.

Application filed November 11, 1920. Serial No. 423,318.

*To all whom it may concern:*

Be it known that we, JULES COSTILLE, a subject of the French Republic, and residing in Brussels, Belgium; and GUILLAUME ROBBE, a subject of the King of Belgium, and residing in Brussels, Belgium, have invented certain new and useful Improvements in Two-Stroke Explosion Valveless Engines; and we 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 letters or figures of reference marked therein, which form a part of this specification.

This invention relates to two stroke explosion engines and more especially to a two stroke explosion engine without valves of the type in which the carburetted mixture is not sucked directly into the explosion chamber; it has for its object an improved structure of two stroke explosion engine in which the compression of the said carburetted mixture takes place in a chamber which is wholly separated from the crank case of the engine.

A further object of this invention consists in particular structural forms of the suction and compression chamber for the carburetted mixture, of the piston and of the guiding means of the latter.

According to this invention the connection rod is slidably mounted in a transverse division wall and is operatively connected to the crank shaft by a guide slidably mounted in a tubular guideway extending into the crank case.

The preliminary compression of the carburetted mixture is effected in the space between the piston and the stop or block which obturates the lower end of the cylinder, said space being in communication with the lateral compression chamber. This lateral chamber is of sufficiently reduced size for obtaining a high degree compression; this chamber is fastened laterally to the cylinder, and can easily be withdrawn for repairing the motor.

The appended drawings show by way of example a two stroke explosion engine constructed accordingly to the present invention.

Figs. 1 and 2 are two vertical midway sections at right angles of a two stroke explosion motor.

Figure 3 is a transverse sectional view the section being taken through the intake and exhaust ports and through the port effecting communication between the suction and compression chamber and the explosion chamber.

The same reference numbers indicate the same parts in the several figures.

Referring to the drawings the cylindrical chamber of the engine is indicated at 1 and terminates in a hemispherical chamber 2. A driving piston 3 reciprocates within the chamber 1 and is connected by a rod 4 and connecting rod 5 to the crankshaft 6.

The lower end of the cylindrical portion 1 of the engine cylinder is closed by a fixed stop 7, through which the piston rod 4 passes. The passage of the piston rod 4 through the stop or block 7 is rendered gas-tight by means of stuffing material, convenient segments or other convenient means.

The lower part of the piston 3 conforms to as nearly as possible the form and size of the highest part of the stop or block 7; in such a way as to reduce to a minimum the space between the stop and the piston when the piston is at the lower end of its stroke.

The cylindrical chamber 1 is provided with four openings:

a the exhaust opening 9.

b the inlet or suction opening 10 for the carburetted mixture; this opening does not communicate with the explosion chamber of the engine, but communicates with the chamber 8, when the piston 3 is sufficiently high.

c the opening 11, through which the carburetted mixture, which has been compressed in the compression chamber 12, enters into the explosion chamber of the cylinder.

d the opening 13 by means of which the space 8 situated between the piston 3 and the lower end 7 of the cylinder communicates with the lateral compression chamber 12.

The operation of the engine is as follows: When the piston is at the upper end of its stroke, a suction of the carburetted mixture from the carburetter through the opening 10 into the space 8 is effected; the piston on going down closes the opening 10, and the

gases are compressed between the piston 3 and the stop 7; further these gases are driven through the opening 13 into the lateral compression chamber 12. When the piston 3 attains the lower end of its stroke, it closes the opening 13 and opens by its upper edge the opening 11; the compressed gas enters through this opening 11 into the explosion chamber of the engine cylinder. The piston on its upward stroke compresses further the gases before their explosion; this double compression of the carburetted mixture secures a convenient degree of carburation and a considerable economy of carbureting material.

This engine as it is above described can be mounted in pairs on the same crank shaft; the essential pieces of the engine are not altered by this fact.

The above description does not mention the usual parts of engine which form no part of the invention.

The stop or block 7 which closes the lower end of the engine cylinder is prolonged by a cylindrical tube which serves as a guideway for the sliding shoe 15 of the crank head 5.

An opening 14 serves for the lubricating of the parts of the piston rod 4 passing into the said stop 7.

The crank case is formed by several parts secured to each other, 13<sup>1</sup>, 13<sup>2</sup>, 13<sup>3</sup>, in such a way that the engine is composed of elements which can easily be removed and mounted together, rendering very easy the inspections and repairs of the engine.

Other structural details of the engine may vary without departing from invention.

Having now particularly described our invention and the manner of its construction and operation, we declare that what we

claim as new and desire to be protected in by Letters Patent is:

In an internal combustion engine the combination with the frame thereof comprising a crank case containing a crankshaft, a cylinder section and a tubular section mounted in fixed position with its lower end constituting a guideway projecting into the crank case, the upper end terminating in a transverse division wall constituting the bottom of the cylindrical chamber, said wall having a central opening therein, a piston within said chamber, a connecting rod having its upper end connected to said piston and extending through said opening with a sliding fit, a guide slidable within said guideway and operatively connecting the lower end of the rod to the crankshaft, said cylinder section containing a suction and compression chamber in juxtaposition with the cylindrical chamber and ports adapted to at times effect communication between the said suction and compression chamber and the space between the piston and said division wall and between the last-mentioned chamber and the space between the piston and the top of the cylindrical chamber, said cylindrical section also having an exhaust port adapted to communicate with said last mentioned space, and an intake port adapted to communicate with the space between the piston and said division wall for the purpose set forth.

In testimony that we claim the foregoing as our invention, we have signed our names in presence of two subscribing witnesses.

JULES COSTILLE.  
GUILLAUME ROBBE.

Witnesses:

FELIX DE CORMAN,  
JOSEPH ONTERO.