J. KYLLIAINEN.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 31, 1911.

1,242,207. Patented Oct. 9, 1917.

Fig. 1.

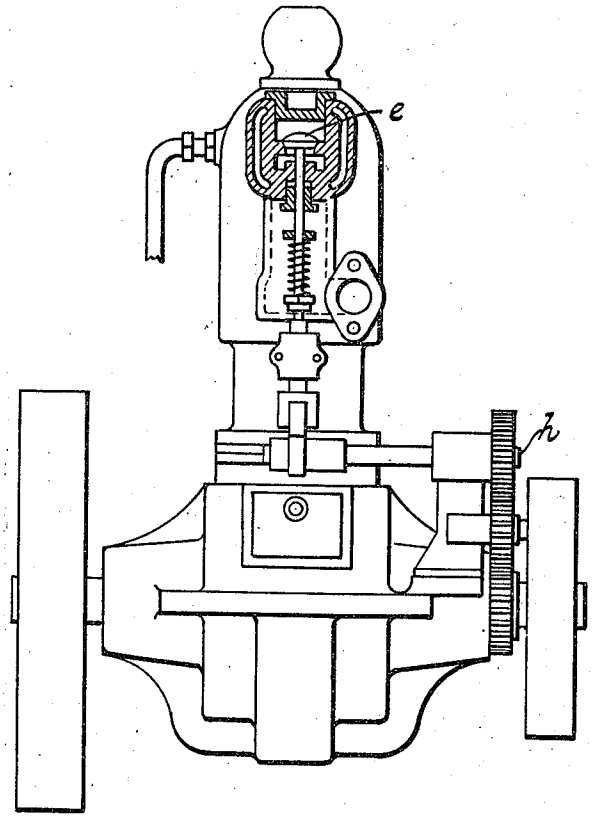


Fig. 2.

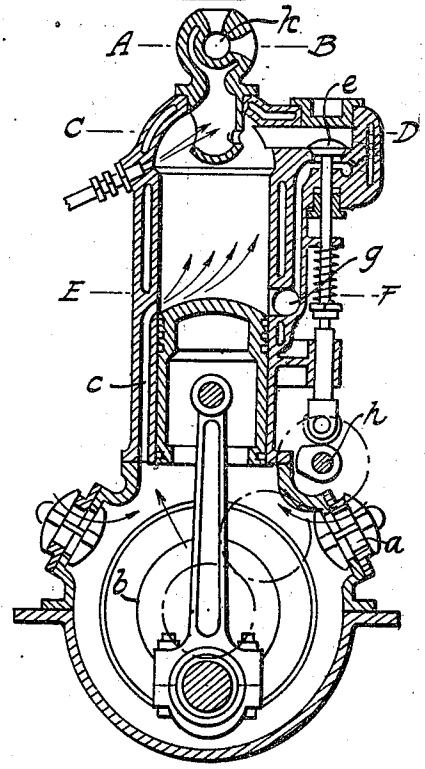


Fig. 3.

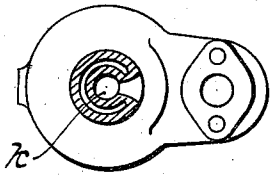


Fig. 4.

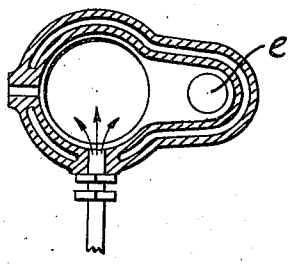
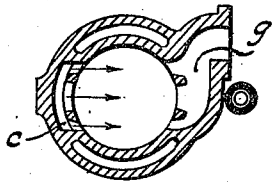


Fig. 5.



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INTERNAL-COMBUSTION ENGINE.

1,242,207. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed August 31, 1911. Serial No. 647,114.

To all whom it may concern:

Be it known that I, JUHANA KYLLIÄINEN, a citizen of Finland, residing at Helsingfors, Finland, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention refers to a two-cycle petrol engine, the characteristic feature of which is, that the engine in addition to having an inlet and outlet port in the lower part of the cylinder, as in ordinary two-stroke engines, is provided with an exhaust valve in the upper part of the cylinder, the said valve being open during the first part of the compression stroke, thus permitting the burnt gases remaining in the cylinder to escape and thus leaving in the cylinder a pure mixture, and then making the length of the expansion greater than that of compression, thus better utilizing the working capacity of the expanding gases.

Referring to the drawing, Figure 1 represents a front view of the engine with the valve seat in section. Fig. 2 is a sectional view of the cylinder, showing the ignition ball, the compression space and the closed crank casing. Fig. 3 is a sectional view through the ignition ball along the line A—B; Fig. 4 is a section along the line C—D; Fig. 5 a section along E—F. The engine operates as follows:—

When the piston approaches its lowest position it uncovers the inlet port of the passage *c* leading from the closed crank casing *b* to the cylinder; the convex top of the piston and a notch in the edge of the same first directs the inrushing air longitudinally upward, but as the port is more uncovered the direction of the stream of air is the more transverse, driving the burnt gases from the lower part of the cylinder by way of the exhaust port *g*. On the up stroke the stream of air again changes its direction from the transverse direction to the longitudinal, the greater part of the cylinder thus being filled with pure air, the burnt gases having been driven to the upper part of the cylinder and only to a small degree having been mixed with the air. But during the first part of the up stroke the valve *e* in the upper end of the cylinder is open and thus the burnt gases are allowed to escape, so that, when this valve closes and the compression begins, the cylinder is filled with almost pure air. During the latter part of the compression stroke the petrol is by means of a pump, controlled by the governor, injected in the ball at the upper end of the cylinder head, and by means of the heat of the ignition ball, vaporized and then ignited. As the compression begins when the piston has already traveled part of the way up on the up stroke the length of the expansion on the down stroke will be greater than in ordinary engines, and thus the working capacity of the exploded gases will be better utilized.

The ignition ball is in the shape of a double sphere. The inside sphere being the hotter one, causes the ignition, as the exploded pressure acts on this ball from the outside. It is stronger and more resistant than ordinary ignition balls in which the explosion pressure acts from the inside. When the engine is to be started the flame of the lamp is directed through the hole *l* inside the inner hole *k*.

By altering the shape of the cam *j* on the shaft *h* which operates the valve *e*, the amount of compression may be altered.

I claim:—

1. In a two-cycle petrol engine, the combination of a cylinder provided at its upper part with an upper exhaust port and at its lower part with a lower exhaust port and a compressed air inlet; a piston in the cylinder and adapted to uncover said lower exhaust port and air inlet at its lower limit of movement; a valve in said upper exhaust port; means for holding open said valve only during the first part of the up-stroke; and an ignition chamber communicating with the upper part of the cylinder and having therein a hollow ignition ball communicating with the outside of the chamber.

2. In a two-cycle petrol engine, the combination of a cylinder provided at its upper part with an upper exhaust port and at its lower part with a lower exhaust port and a compressed air inlet; a piston in the cylinder and adapted to uncover said lower exhaust port and air inlet at its lower limit of movement; a valve in said upper exhaust port; means for holding open said valve only during the first part of the up-stroke; and an ignition chamber communicating with the upper part of the cylinder and having therein a hollow ignition ball communicating with the outside of the chamber by two channels at an angle to each other.

3. In a two-cycle explosion engine, the combination of a cylinder provided at its

upper part with an upper exhaust port; a fuel inlet; and at its lower part with an air inlet and lower exhaust port; a piston in the cylinder and provided with an upwardly rounded upper face and adapted to uncover said air inlet and lower exhaust at its lower limit of movement; a crank case connected to the cylinder and communicating with the air inlet; a crank-shaft having its crank linked to the piston; a normally closed valve in said upper exhaust port; a cam operatively connected to the crank-shaft of the engine and adapted to hold open said valve during the first part of the up-stroke; and a spherical ignition chamber communicating with the upper part of the cylinder and provided with a hollow ignition ball communicating with the outside by two channels at right angles to each other.

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

JUHANA KYLLIÄINEN.

Witnesses:
ANNA SCHROEDER,
HJALMAR AKER BLOM.

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