Jan. 5, 1926. 1,568,342

A. D. MacFARLANE

INTERNAL COMBUSTION ENGINE

Filed April 28, 1924

Fig. 1.

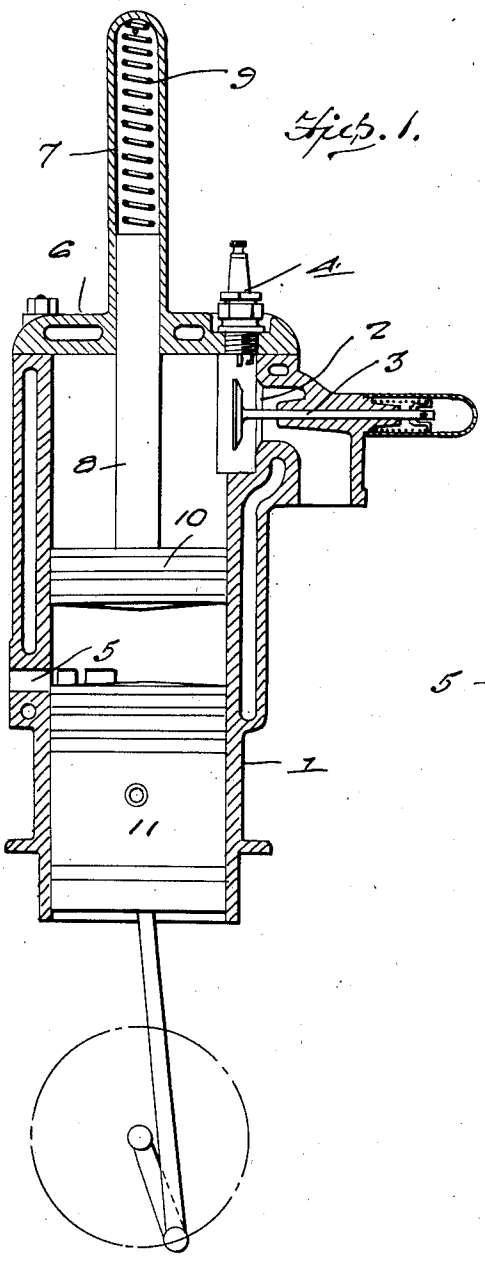
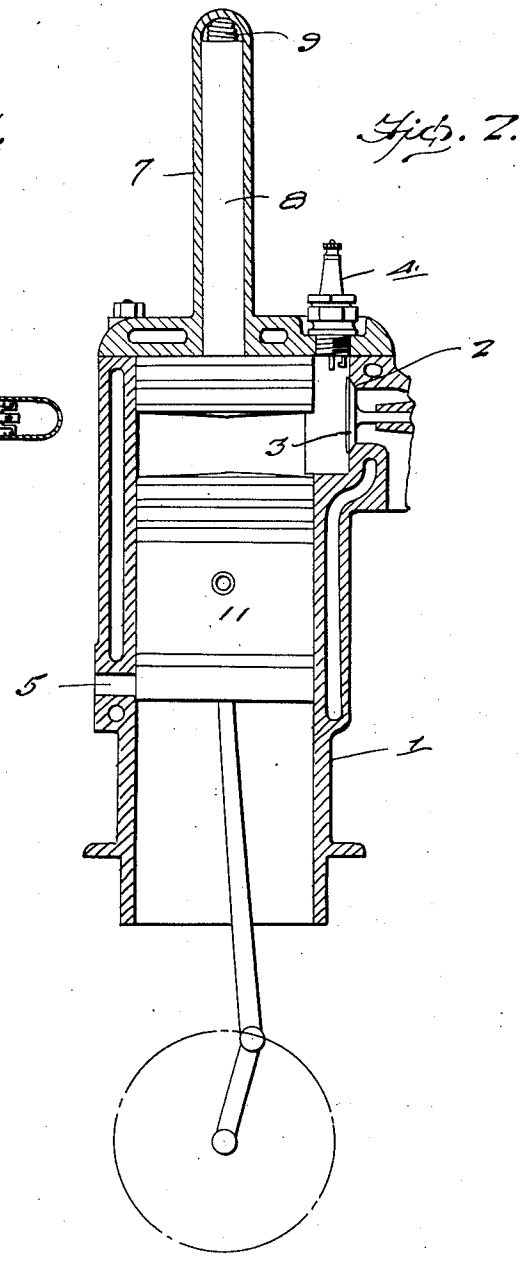


Fig. 2.



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UNITED STATES PATENT OFFICE.

ARTHUR D. MacFARLANE, OF SEATTLE, WASHINGTON.

INTERNAL-COMBUSTION ENGINE.

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To all whom it may concern:

Be it known that I, ARTHUR D. MacFARLANE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, and it consists in the novel features hereinafter described and claimed.

An object of the invention is to provide an engine of the character stated, which is light in weight, and which may develop maximum power.

A further object of the invention is to provide in such an engine, means whereby the products of combustion are completely expelled from the engine cylinder at the ends of the power stroke of the piston, and means whereby premature explosions in the crank casing are avoided.

With the above objects in view, the structure includes a cylinder having a valve controlled inlet port provided in the vicinity of one end thereof, and an exhaust port provided at points between the ends thereof. A main piston is slidably mounted in the cylinder, and may be operatively connected with the valve on the inlet port, in any approved or usual manner. A displacer piston is slidably mounted in the cylinder, for movement across the valve controlled inlet port, but its path of movement within the cylinder is limited by the first mentioned piston to align approximately at the exhaust part of the cylinder.

In the accompanying drawing,

Figure 1 is a sectional view of the engine, showing the positions of the parts when the main piston is at the ends of the power stroke, in the cylinder.

Figure 2 is a similar view, showing the relative positions of the parts, when the main piston is at the end of its compression stroke, in the cylinder.

The engine comprises a cylinder 1 having an inlet port 2, at one end, the passageway through which is controlled by a valve 3, in a usual manner. A spark plug 4 is mounted in the side of the cylinder 1 just beyond the inner end of the inlet port 2. The cylinder 1 is provided, at a point between its ends with one or more exhaust ports 5. One end of the cylinder 1 is closed by a head 6, having a central tubular guide 7. A stem 8, is slidably mounted in the guide 7, and a spring 9 is interposed between the outer end of the stem 8 and the outer end of the guide 7, and is held within the guide. A displacer piston head is slidably mounted in the cylinder 1 and is carried by the stem 8. A main piston 11 is slidably mounted in the cylinder 1, in a usual manner.

By the intake stroke of the piston 11, the mixture is drawn into the upper portion of the cylinder 1, through the inlet port 2 thereof, and past the valve 3. As the piston 11 moves away from the head 6, the piston 10, follows the said piston 11, and when the piston 10 passes over the port 2, the mixture is drawn into the cylinder 1 between the piston 10 and the head 6. When the piston 11 moves toward the head 6, it first encounters the piston 10, and moves the said piston toward the head 6, against the spring 7. At the same time, the valve 3 is moved to a closed position over the port 2. Thus, the mixture is trapped, in the upper portion of the cylinder 1, and is compressed by the pistons 10 and 11. When the piston 11 arrives at the upper end of its stroke, the compressed mixture passes around the piston 10, and enters the space between the pistons 10 and 11, as shown in Figure 2. At this time, the mixture is fired by the spark plug 4, and the expanding gases move the piston 11, in the cylinder 1 beyond the exhaust ports 5, thus permitting the products of combustion to escape from the cylinder 1. At the same time, the tension of the spring 7 comes into play, and the piston 10 is moved toward the exhaust port 5 in the cylinder 1, and the products of combustion are driven out of the cylinder 1, through the exhaust port 5.

Having described the invention, what is claimed is:

An internal combustion engine including a cylinder provided at one end in its side wall with a transversely extending recess having a valve controlled inlet port, and at a point between its ends with an exhaust port, a head on said end of the cylinder provided with an outwardly extending hollow guide, a piston mounted for movement in the cylinder and adapted to cover and uncover the exhaust port, a displacer piston mounted in the cylinder at the end adjacent the head and adapted to move across the in-

take port in a path of movement which terminates short of the exhaust port, a stem extending from the displacer piston into the hollow guide, a spring impinging against the outer end of the hollow guide and the end of the stem, and a mixture ignition means disposed through the head and extending into the recess to function between the intake port and the path of movement of the displacer piston.

In testimony whereof I affix my signature.

ARTHUR D. MACFARLANE.