J. M., A. C. & A. JOHNSON.

TWO-CYCLE GAS ENGINE.

APPLICATION FILED DEC. 22, 1908.

948,860. Patented Feb. 8, 1910.

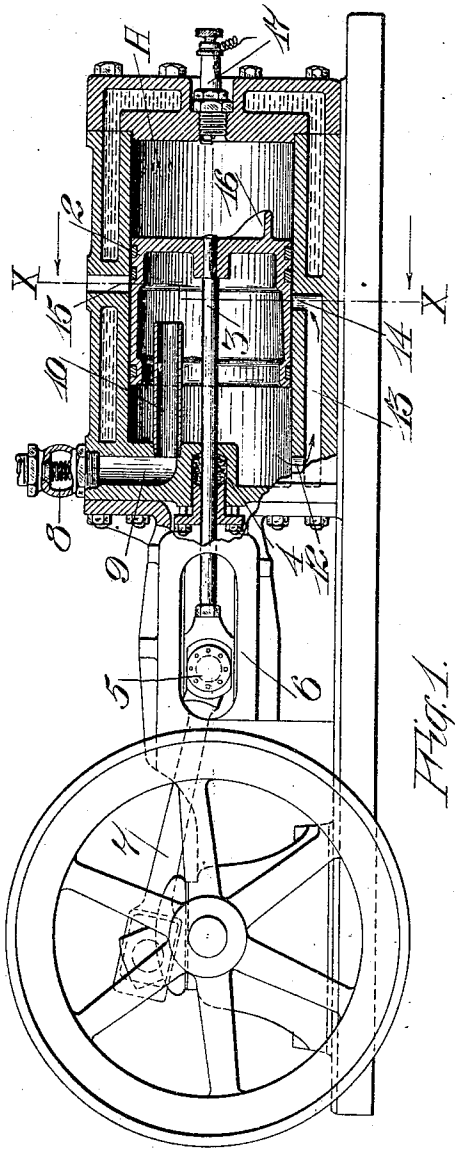

Fig. 1.

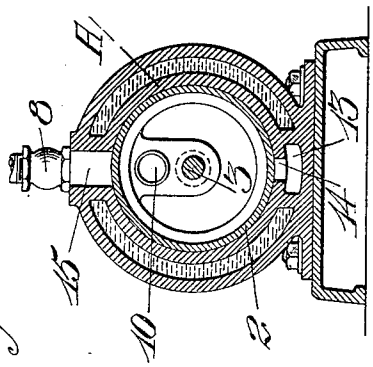

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN M. JOHNSON, ALFRED C. JOHNSON, AND AUGUST JOHNSON, OF SUNNYVALE, CALIFORNIA.

TWO-CYCLE GAS-ENGINE.

948,860. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed December 22, 1908. Serial No. 468,730.

To all whom it may concern:

Be it known that we, JOHN M. JOHNSON, ALFRED C. JOHNSON, and AUGUST JOHNSON, all citizens of the United States, residing at Sunnyvale, in the county of Santa Clara and State of California, have invented new and useful Improvements in Two-Cycle Gas-Engines, of which the following is a specification.

Our invention relates to improvements in gas engines, particularly of that class known as two-cycle engines.

It consists in a means by which the piston of the engine may be partially cooled, so as to prevent pre-ignition which is otherwise caused by the piston becoming overheated, to prevent the burning of lubricating oil, and to provide a more perfect vaporization, so that a lower grade of fuel may be employed.

It also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation partially in section. Fig. 2 is a cross-section on line X—X, Fig. 1.

The cylinder A is provided with the usual cooling appliances, which may either be water chambers, or air cooling devices, and is closed at both ends. The piston 2 has a piston-rod 3 passing through a stuffing-box at 4, a cross-head 5 traveling in guides 6, and a connecting rod 7 extending to the crank on the crank shaft. The charge of combustible mixture is admitted to the engine through a valve, at 8, from the carbureter or source of supply not here shown. From this valve it passes inwardly through a passage 9, and is thence admitted into a pipe 10 which extends longitudinally from the inlet passage within the outer portion of the cylinder and toward the piston 2. This outer portion of the cylinder, by reason of its closed end and stuffing-box, forms a compression chamber of the engine, and from this chamber a port 12 opens into a conducting passage 13 exterior to the inner wall of the cylinder. From this passage a port 14 opens through the inner wall of the cylinder. This port is normally closed by the periphery of the piston until the latter approaches the limit of its power stroke, at which instant this port 14 is opened, and gas which has been compressed in the outer chamber of the cylinder is allowed to pass through this port into the explosion chamber of the engine.

15 is the exhaust port which opens into the cylinder at a point where it is exposed for the escape of the products of combustion just previous to the opening of the inlet port. Thus, any products of combustion are allowed to escape through the exhaust port under whatever pressure remains within the cylinder at the termination of the stroke, and an instant later the compressed explosive charge enters the cylinder, and by means of the deflector 16 is caused to pass to the inner head of the cylinder; and in the process of filling the cylinder with a combustible charge, it eliminates and forces out the remainder of the products of combustion before the exhaust passage is closed. The compression of this gas takes place on the return stroke of the piston, and at the desired point in the cycle the charge is ignited by the usual spark plug, or equivalent means, indicated at 17.

The charge of cool gas and air forming the explosive mixture which enters through the passage 10 is delivered against the piston 2, and it acts first to partially cool and reduce the temperature of the piston; and this allows the engine to be run at a higher speed, without so increasing its internal temperature as to injuriously burn the lubricating oil. This saves the oil, as well as prevents carbonizing the interior of the cylinder. It also serves to prevent the temperature rising to such a point as to cause a pre-ignition of the gas before it is in position to do its work. A further advantage is that the heat of the piston raises the temperature of the charge before it enters the working end of the cylinder, and it enables the engine to be run with a much cheaper grade of fuel. In case there is any lack of perfect vaporization of the charge, this increase in temperature will substantially complete the vaporization, so that when the charge enters the working end of the cylinder it will be in the condition of highest efficiency for the work.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. In an engine of the character described, the combination of a cylinder closed at both ends, a piston adapted to reciprocate in said

cylinder, a piston rod extending through the outer ends of the cylinder, a crank shaft to which the outer end of said rod is connected, an inlet valve at one end of the cylinder, said cylinder having a passage at one end connecting with said valve and adapted to admit an explosive mixture to the outer portion of the cylinder, a pipe extending substantially parallel with the axis of the cylinder having one end connecting with said inlet passage and the other end leading toward the piston, said cylinder having its compression chamber formed between the piston and the end of the cylinder containing said passage and into which chamber said pipe leads, whereby the charge of cool gas and air forming the explosive mixture is delivered against the piston and acts to partially cool and reduce the temperature thereof, a supplementary passage and ports through which the charge is admitted from the compression chamber to the working end of the cylinder, said port being controlled by the operation of said piston.

2. In an engine of the character described, the combination of a cylinder closed at both ends, a piston adapted to reciprocate in said cylinder, a piston rod extending through the outer ends of the cylinder, a crank shaft to which the outer end of said rod is connected, an inlet valve at one end of the cylinder, said cylinder having a passage at one end connecting with said valve and adapted to admit an explosive mixture to the outer portion of the cylinder, a pipe extending substantially parallel with the axis of the cylinder having one end connecting with said inlet passage and the other end leading toward the piston, said cylinder having its compression chamber formed between the piston and the end of the cylinder containing said passage and into which chamber said pipe leads, whereby the charge of cool gas and air forming the explosive mixture is delivered against the piston and acts to partially cool and reduce the temperature thereof, a supplementary passage and ports through which the charge is admitted from the compression chamber to the working end of the cylinder, said port being exposed at the termination of the outward stroke of the piston, a deflector carried by the piston, an exhaust port controlled by said piston, and means for igniting the charge compressed in the working chamber of the cylinder.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOHN M. JOHNSON.
ALFRED C. JOHNSON.
AUGUST JOHNSON.

Witnesses:
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L. H. VISHART.