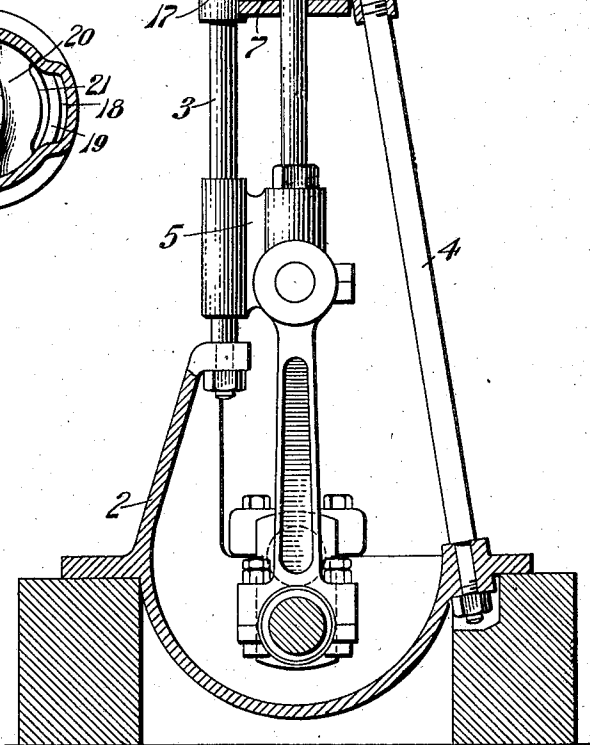
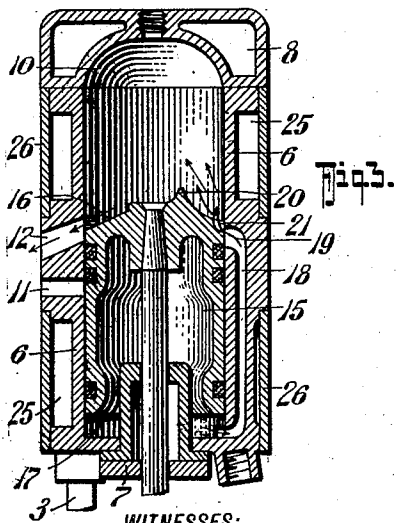
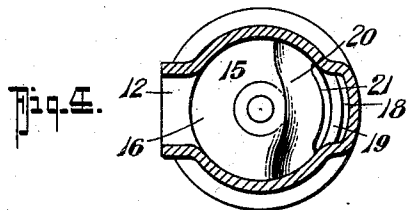
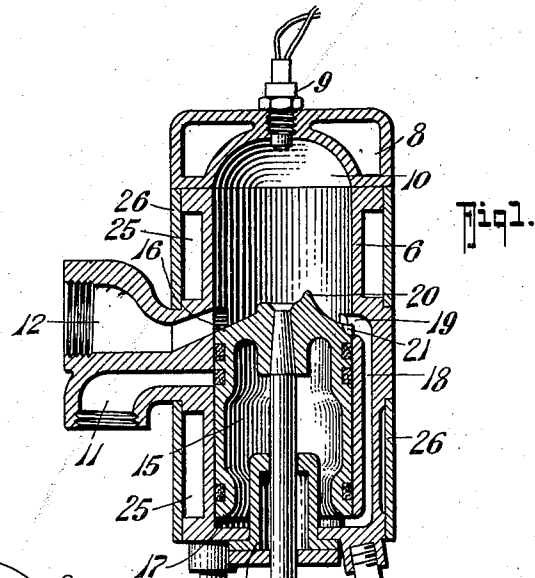
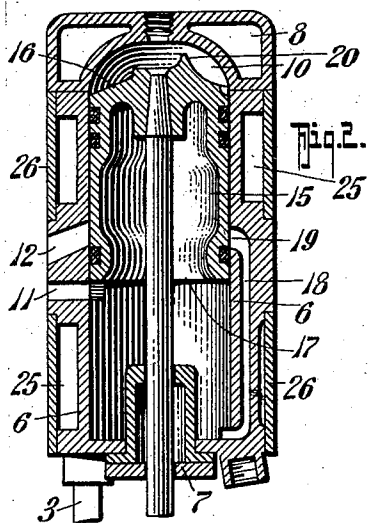


J. T. COWIE.
GAS ENGINE.
APPLICATION FILED NOV. 28, 1906.

935,091.

Patented Sept. 28, 1909.



WITNESSES:

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GAS-ENGINE.

935,091.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed November 28, 1906. Serial No. 345,455.

To all whom it may concern:

Be it known that I, JOHN T. COWIE, a citizen of the Dominion of Canada, residing at New Westminster, in the Province of British Columbia, Canada, have invented a new and useful Improvement in Gas-Engines, of which the following is a specification.

This invention is an internal combustion engine of the two-cycle valveless type.

A novel feature of my invention lies in the conformation of the upper side of the piston which controls the entrance of the explosive mixture, whereby the inert gases, forming the residuum of the explosive charge which has performed its work are swept from the cylinder by the incoming explosive mixture which has been mixed and compressed on the under side of the piston.

There are also other novel and advantageous details in the construction of the engine to which attention is drawn in the course of the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is a vertical section through a vertical engine showing the piston at the bottom of its stroke, Fig. 2, a similar view of the same cylinder with the piston at the top of its stroke and at about the position of ignition, Fig. 3, a similar view of the same cylinder showing the piston in a position as having opened the exhaust port and just beginning to open the admission port for a recharge, and Fig. 4, a plan of the piston showing the conformation of its upper side in relation to the ports.

In these drawings 2 represents the bed plate carrying the crank shaft bearings and resting on the foundation timbers to which the engine is secured, 3 represents the back rods and 4 represents a front rod supporting the cylinder. The back rods 3 form the guide for the cross head 5 and the rod 4 is inclined outwardly at the foot to form a diagonal stay.

The cylinder is formed with a closed lower end having a removable gland box 7, and the upper end is provided with a water jacketed cover 8 carrying the ignition plug 9, the inner side of the cover having a recess 10 corresponding to the bore of the cylinder and having full rounded corners as drawn.

The piston 15 of the cylinder is deep and

is ring-packed, the rings being arranged in a manner to be described later.

The gas admission and exhaust ports 11 and 12 are adjacent, the exhaust port 12 being so situated in regard to the length of the cylinder and the depth of its piston 15, that the port is fully uncovered by the upper edge 16 of the piston on the side next to it, when the piston is at the bottom of its stroke, as shown in Fig. 1, and the position of the gas admission port 11, such that it is fully uncovered by the lower edge 17 of the piston when such piston is at the upper end of its stroke.

From the lower end of the cylinder 6 below the lower edge 17 of the piston when such piston is at the bottom of its stroke, as shown in Fig. 1, a passage 18 communicates with the upper side of the piston through a port 19 diametrically opposite to the exhaust port 12, the position of the port 19 being such that the uncovering of it by the upper edge, adjacent to it, of the piston occurs shortly after the upper edge 16 of the piston commences to uncover the exhaust port 12.

Opposite to the port 19 of the passage 18 the upper surface of the piston is shaped somewhat as shown in the drawing to form a baffle 20 to direct the entering explosive mixture toward the upper end of the cylinder and prevent it from shooting directly across to the exhaust port 12. To insure that this upwardly directed entering gas does not cut off within the volume of the upper end of the cylinder any material amount of the inert residuum of the last exploded charge, the surface of the baffle 20 immediately adjacent to the port 19 is stepped slightly down in a rounded fillet 21, by which means, when the upper edge of the piston on this side first uncovers the upper edge of the port 19, the entering gas will be directed up the side of the cylinder opposite to the exhaust port 12, and the residuum of inert gas will be swept toward the exhaust port 12, which sweeping action will be completed as the port is more fully opened, by the entering gas encountering the curved face of the baffle 20.

The cylinder 6 is provided with a water-jacket space 25 inclosing its barrel and the greater part of the passage 18. The water space 25 is formed by shrinking bored sections 26 of a wrought iron or steel tube onto

turned seats on the mid-length portion of the cylinder, adjacent to the admission and exhaust passages and onto flanges on the upper and lower ends of the cylinder respectively. By this construction the cylinder casting is simplified and the uniformity of its metal insured.

The piston rings are arranged in the manner shown in the drawings, two being provided toward its upper end that will effectually seal the piston during the period of explosion and expansion and one ring being provided toward the lower end of the piston to seal the piston and prevent passage of working agent from the port 11 directly to the port 12.

The operation of the engine is as follows: Starting from the top end of the stroke of the piston, the position shown in Fig. 2, the gas and air having entered through the port 11 to the under side of the piston and the explosive charge having been compressed on the upper side, that charge is ignited and the explosion drives the piston down compressing on the under side of the piston the charge of gas and air just drawn in.

As the upper edge 16 of the piston uncovers the port 12 the products of combustion which have done their work, escape through it to the exhaust, while the gas and air drawn in through the passage 11, are compressed in the lower end of the cylinder until the movement of the upper edge of the piston adjacent to the port 19 past the upper edge of that port permits such compressed gas and air to pass from the under to the upper side of the piston and through the action previously described to effectually sweep out the residuum of the last exploded charge therefrom.

The further movement of the engine carries the piston up and the newly entered charge is compressed until its ignition toward the upward limit of the piston's stroke, during which movement a partial vacuum is formed on the under side of the piston which draws the next charge of gas and air into the under end of the cylinder through the port 11 when toward the upward limit of the stroke, that port is uncovered by the lower edge 17 of the piston.

The proximity of the gas and air inlet to the exhaust outlet is advantageous in that such gas and air is brought in contact with the highly heated metal forming the partition between such inlet and outlet immediately prior to the expansion of the gas into the partial vacuum in the under end of the cylinder, by which means a very thorough vaporization of the hydro-carbon fluid and mixture of it with the air is insured. This fact and the means by which the inert residuum is swept out of the end of

the cylinder wherein the charge has been exploded results in a very efficient combustion in this engine.

An engine is thus provided having all the merits of the "two cycle" system with the advantage of having at all times the crank shaft, connecting rod and crosshead under observation and accessible for repair.

The design of the engine lends itself to a particularly simplified construction of the several parts both in the matter of casting and machining enabling it to be cheaply produced.

Having now particularly described my invention and the manner of its construction and operation I hereby declare that what I claim as new and desire to be protected in by Letters Patent is:

1. In a gas engine, a cylinder with a piston controlled gas admission port on one side and a piston controlled exhaust port on the other, said cylinder having a piston endwise movable in the cylinder the surface of which piston exposed to the explosion being furnished with a baffle having a concave curved surface toward the admission port and a depressed fillet along the edge adjacent to the admission port.

2. A gas engine comprising in combination, a cylinder having closed ends, a piston endwise movable in the cylinder and dividing the cylinder into a pumping chamber and an explosion chamber, said cylinder having a piston controlled working agent admission port in the pumping end of the cylinder, said cylinder having a passage from the pumping end of the cylinder to the explosion end of the same, the port of which passage into the explosion end is controlled by the piston, said cylinder having a piston controlled exhaust port from the explosion end of the cylinder, said working agent admission port and said exhaust ports being elongated and lying in close juxtaposition whereby the exhaust gases will heat the new working agent, a support for said cylinder consisting of a crank casing, standards projecting therefrom and joining with the cylinder, a piston rod connected with said piston and projecting to the outside of the cylinder, a crank shaft having a crank, and a pitman connecting said shaft with said piston rod, said piston having a baffle to cooperate with the inlet port to the explosion end of the cylinder and having a depressed fillet cooperating with the baffle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. COWIE.

Witnesses:

ROWLAND BRITAIN,
S. P. JUDGE.