J. ONEILL.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 14, 1913.

1,117,893.

Patented Nov. 17, 1914.

3 SHEETS—SHEET 1.

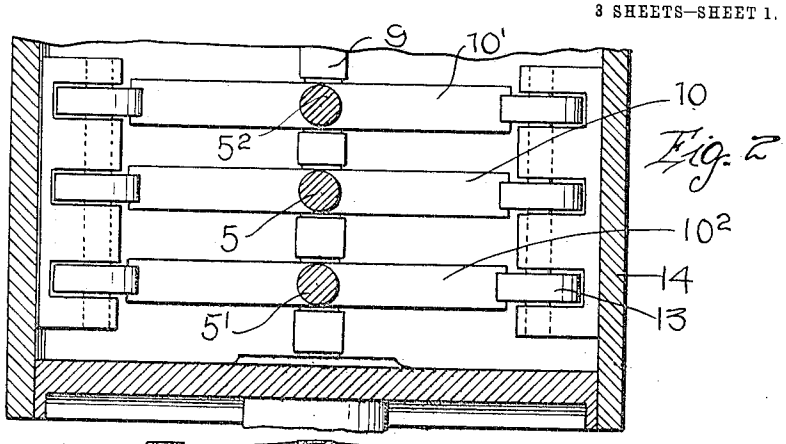


Fig. 2

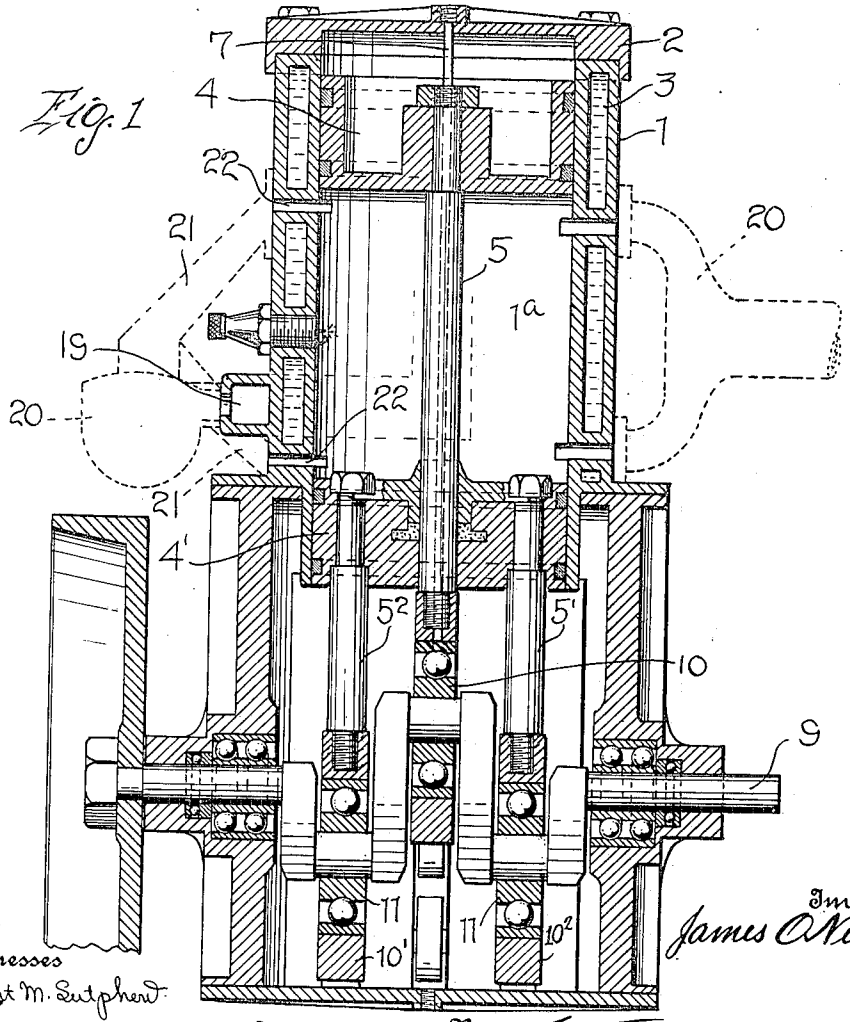


Fig. 1

Witnesses

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3 SHEETS—SHEET 2.

Fig. 4

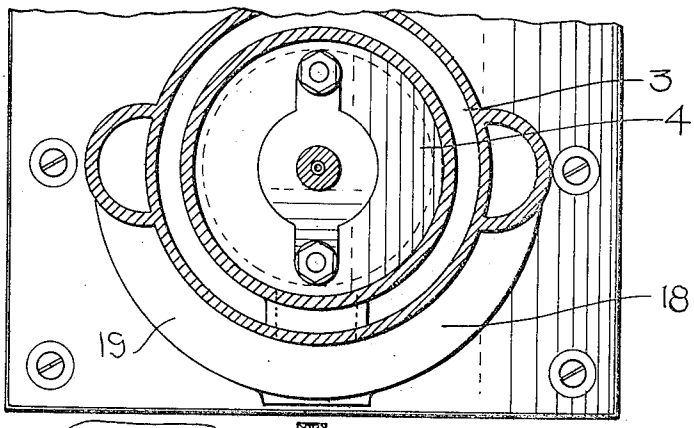
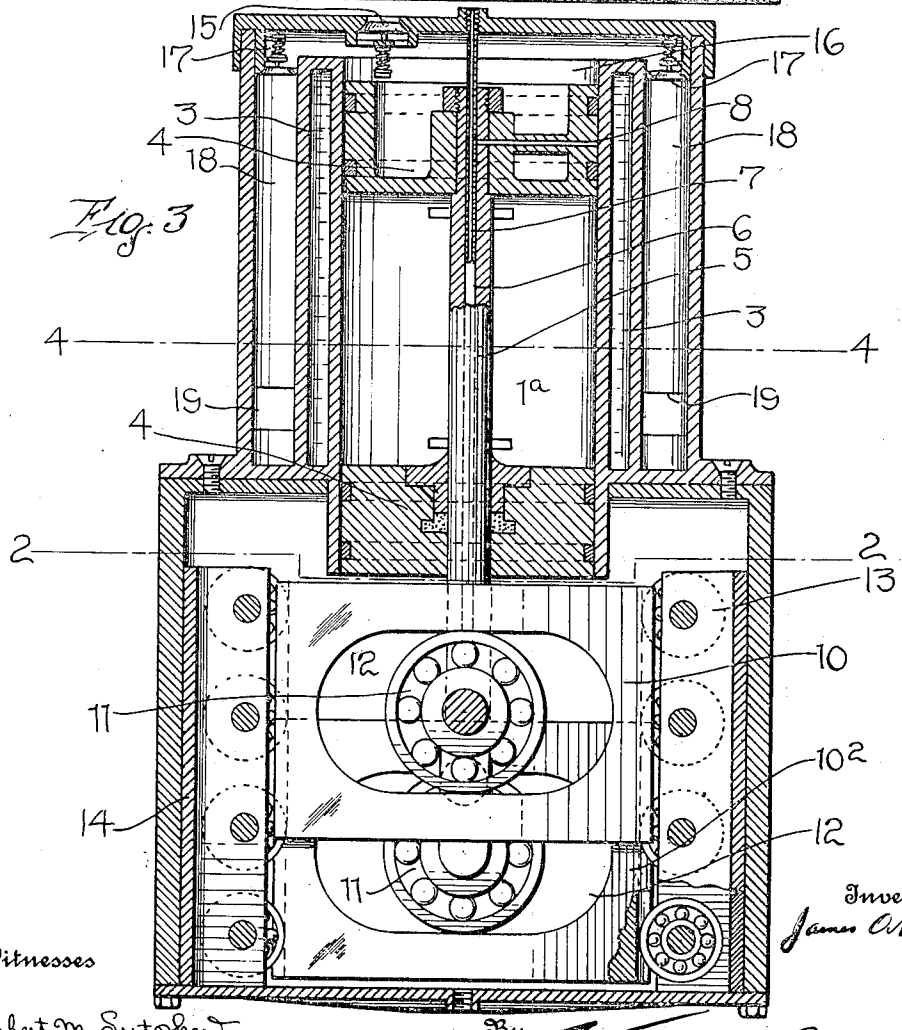


Fig. 3



Witnesses

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3 SHEETS—SHEET 3.

Fig. 6

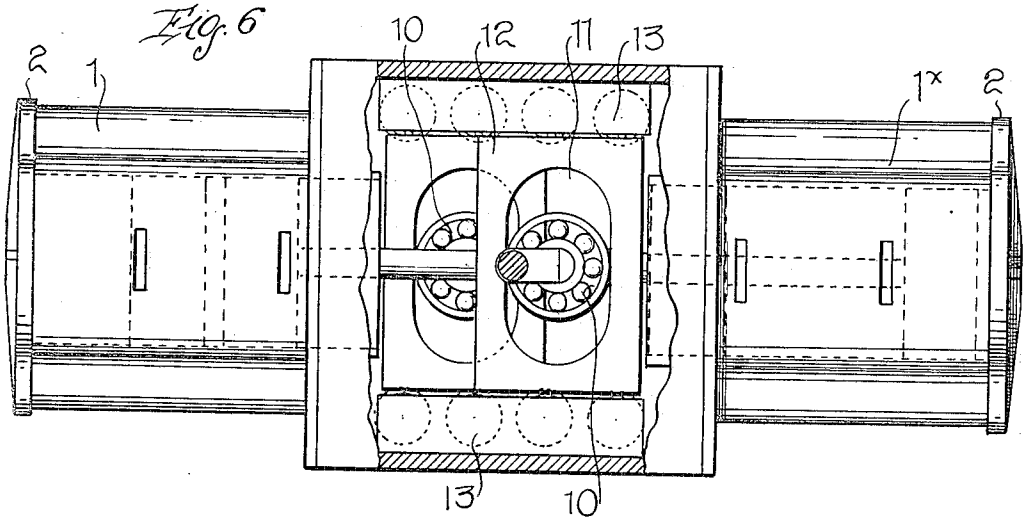
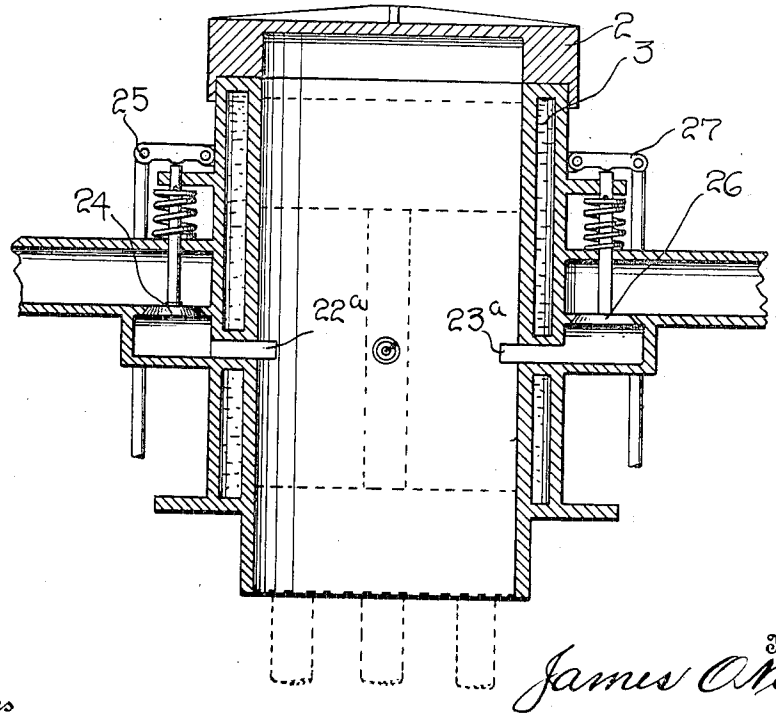


Fig. 5



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES ONEILL, OF BROOKLYN, NEW YORK.

INTERNAL-COMBUSTION ENGINE.

1,117,893. Specification of Letters Patent. Patented Nov. 17, 1914.

Application filed August 14, 1913. Serial No. 784,809.

To all whom it may concern:

Be it known that I, JAMES ONEILL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to multiple piston internal combustion engines and particularly to that type of such engines in which the combustion chamber is provided between two oppositely moving reciprocating pistons.

One object of the invention is to apply the power from both pistons to a common crank shaft and thereby greatly simplify the construction, reduce the over-all dimensions of the engine and economize in the development and application of power; incidental to which the piston rod connection from one piston comprises a pair of rods disposed symmetrically to and on opposite sides of the rod from the other piston so that all the rods can extend in the same direction toward the common crank shaft.

A further object is to provide for straight thrust drive between the pistons and the crank shaft, and thereby not only obviate the objections of angular thrust in the pistons, but also to admit of rigid connection between the piston rods and their pistons; and incidentally to admit of having a rod from one piston operate through an opening in the other piston in extending toward the common crank shaft; and in carrying out this feature of the invention, the piston rods are preferably connected directly with the cranks on the common shaft, through the medium of cross head yokes, and these yokes are preferably fitted with ball bearings.

Another object of the invention is to provide novel means for lubricating different parts of the engine and particularly to lubricate bearings through the top of the cylinder.

A further object relates to the carbureting system according to which air for supporting combustion is conducted through the chamber in the cylinder construction and is thereby warmed before passing to the carbureter.

Another feature of the invention relates to the location and operation of the valves whether employed in a two-stroke cycle or a four-stroke cycle motor.

Another feature relates to the arrangement of the different intake and exhaust ports which insures practical operation of the different types of motors.

It is to be understood that the several features of the invention relate to a single cylinder engine, but the number of cylinders may be multiplied at will and the several cylinders arranged in any desired relation; also that the several features of the invention may be embodied in either two-stroke or four-stroke cycle engines. It is, therefore, to be understood that the disclosures herein made are for purposes of illustration and not to be taken as limitations of the invention.

For purposes of illustration, the invention is shown in the accompanying drawings as applied to a single unit double piston upright motor, and also to a motor having two opposed double piston units.

In said drawings:—Figure 1 is a vertical sectional view of my improved motor showing the carbureter, and intake and exhaust pipes in dotted lines; Fig. 2 is an enlarged section on the line 2—2 of Fig. 3; Fig. 3 is a vertical sectional view showing the embodiment of the invention in a two-stroke cycle engine; Fig. 4 is a sectional view on the line 4—4 of Fig. 3; Fig. 5 is a vertical sectional view showing an embodiment of the invention in a four-stroke cycle engine; and Fig. 6 is a side view of a modified embodiment of the invention in which two double piston cylinders are opposed to each other, on opposite sides of the common crank shaft.

Referring to the drawings in detail, 1 designates a cylinder having a removable cap 2 and the usual water jacket 3, which surrounds the cylinder and serves to keep the cylinder cool when running.

4 and 4′ designate a pair of oppositely reciprocating coacting pistons, housed in such relation as to provide a combustion chamber 1^a between them, said pistons being preferably mounted in the common cylinder 1 and provided, respectively, with a single piston rod 5, and with a pair of piston rods 5′, 5^2, all rigidly connected to their pistons. The intermediate piston rod 5 is constructed with an axial bore 6 (see Fig. 3) and has a suitable pipe connection 7 which telescopes therein and provides means for supplying oil to the piston 4, whence it escapes through radial duct 8 to the inside of the cylinder for

lubricating the same. Furthermore the bore 6 extends through the length of the single piston rod 5 and provides means for supplying the crank case with oil. The pistons 4 and 4′ are of the same construction in every embodiment of my invention. The remote piston 4 has a single rod 5 slidably fitted to work through the piston 4′ while the nearer piston 4′ has a double rod connection arranged symmetrically on opposite sides of the single rod. All of the piston rods 5, 5′ and 5^2 are connected to a common crank-shaft 9, by cross-head yokes 10, 10′, 10^2. These yokes are preferably made to bear upon the crank-wrists through the medium of ball bearings 11 working in the slots 12 of the yokes, and these yokes are guided in their right line movements by means of rollers 13 mounted in the crank case 14 (see Figs. 1, 2 and 3.)

With the construction above described the pistons are allowed straight thrust in the cylinder, and the tendency to tip therein is eliminated; moreover, the piston rods always retain their straight rigid relation to the pistons and the danger of the rods breaking at the wrist pins is thus avoided.

The present invention further involves the novel system of forced feed warm air carburation, according to which the remote piston adjacent the closed end of the cylinder is utilized to draw in the charge of air and thereafter force it through heating flues to and through the carbureter where the air, warmed in its passage, takes up the necessary quantity of fuel and enters the combustion chamber. Taking, for instance, the two-stroke cycle embodiment of the invention shown in Fig. 3, an air intake valve 15 is provided in the cylinder head, which unseats in response to external air pressure and admits a charge of air to the chamber 16 on the down-stroke of the remote piston 4. On the up-stroke of said piston, the charge of air is displaced past the two check valves 17 and forced into the down-take heating flues 18 which are kept warm by the combustion chamber, whence said air passes through the horizontal passage 19 to the carbureter 20 and thence through the manifold 21 to the intake ports 22 of the combustion chamber, entering the latter as said ports 22 are uncovered by the pistons, pressure behind the charge being relied upon for introduction of the fuel mixture in the two-stroke cycle motor of Fig. 3, and such pressure together with a rarefaction in the combustion chamber being relied upon when this feature is employed in a four-stroke cycle motor.

Referring to Fig. 5, which shows the embodiment of the coacting opposed pistons in a four-cycle motor, the intake port 22^a and the exhaust port 23^a are located at intermediate positions in order to be in communication with the combustion chamber when the pistons have approached each other and these ports are guarded by fuel-intake valve 24 adapted to be unseated by the valve gear 25 and the exhaust valve 26 adapted to be operated by the valve gear 27.

According to the embodiment shown in Fig. 6, a plurality of cylinders 1, 1^x, each of which is to be understood as containing a pair of coacting opposed cylinders connected to a common crank shaft, are located in different radial positions relatively to the common crank shaft, so as to develop a tandem or other multiple radial system of cylinders. Where the cylinders are located on the same diameter as in Fig. 6, the corresponding pistons of the respective cylinders will be connected to the same cross-head yokes, but if such cylinders are located on radii which are not in alinement, it will, of course, be necessary that they operate through independent cross-head yokes.

I claim:—

1. An engine comprising a working cylinder, a pair of suitably housed pistons therein, having opposed pressure-receiving faces adapted to receive pressure in opposite directions from the same charge of pressure medium, a crank case communicating with one end of said cylinder, a single crank shaft in said crank case, suitable connections between both pistons and said single crank shaft, an air-compressing chamber communicating with the other end of said cylinder and having a valved air intake port, a fuel mixture supply device, having an intake port communicating with the combustion chamber, a pair of diametrically opposite valved flues leading from said air-compressing chamber, extending longitudinally along the cylinder in heat-absorbing relation thereto, and a circumferentially extending passage connecting said flues with the mixing chamber of the fuel mixture supply device.

2. In an internal combustion engine, the combination of a common cylinder, a pair of co-acting oppositely reciprocating pistons suitably housed in said cylinder and providing a combustion chamber between them, a common crank shaft located at one end of the cylinder, piston rods connecting said crank shaft with both pistons in said cylinder, the piston rod from the remote piston extending through and having reciprocating bearing in the near piston, a lubricant supply tube located at the end of the cylinder opposite the crank shaft and beyond the piston remote from said crank shaft, and telescoping with said remote piston and the rod extending therefrom.

3. In an internal combustion engine, the combination of a common cylinder, a pair of co-acting oppositely reciprocating pistons suitably housed in said cylinder and pro-

viding a combustion chamber between them, a common crank shaft located at one end of the cylinder and having connection with both pistons in said cylinder, and a lubricant supply located at the end of the cylinder opposite the crank shaft and beyond the piston remote from said crank shaft; said lubricant supply comprising a feed tube telescoping with said remote piston and fixed in the cylinder head, and said piston being constructed to distribute oil supplied through said tube to the walls of the cylinder by a radial passage extending through said piston.

4. In an internal combustion engine, the combination of a common cylinder, a pair of co-acting oppositely reciprocating pistons suitably housed in said cylinder and providing a combustion chamber between them, a crank case communicating with one end of said cylinder, a common crank shaft located at one end of the cylinder, piston rods connecting said crank shaft with both pistons in said cylinder, the piston rod from the remote piston extending through and having reciprocating bearing in the near piston, a lubricant supply tube located at the end of the cylinder opposite the crank shaft and beyond the piston remote from said crank shaft, and telescoping with said remote piston and the rod extending therefrom; said piston rod of the remote piston having a duct in continuation of said lubricant supply tube and leading into the crank case.

The foregoing specification signed at Brooklyn, New York, this 24th day of July, 1913.

JAMES ONEILL.

In presence of two witnesses—
WILLIAM J. CHAFFERS,
RAFFAELO SYNEZLIO.