July 22, 1924. 1,502,609

H. J. ASCHERIN ET AL

INTERNAL COMBUSTION ENGINE

Filed May 17, 1922 2 Sheets-Sheet 1

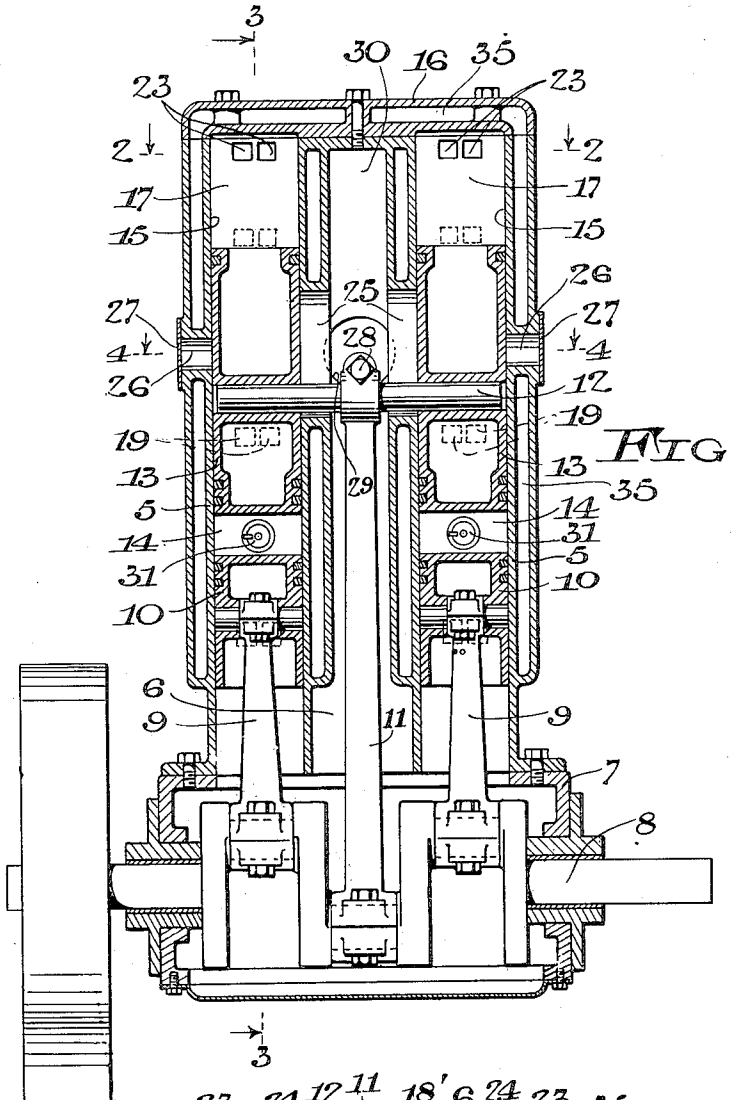

FIG. 1

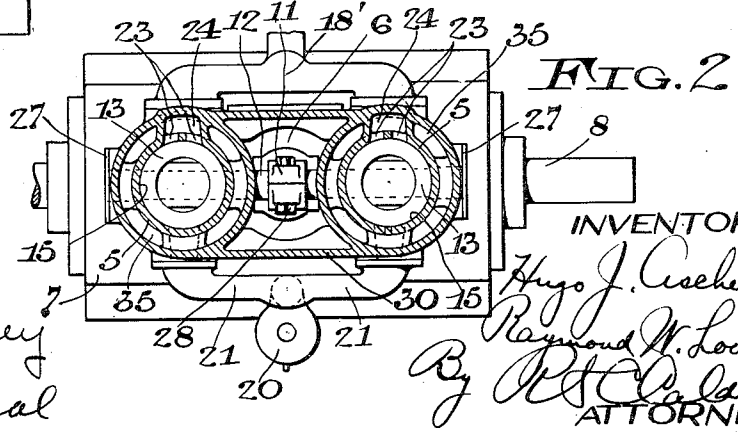

FIG. 2

WITNESSES

M. E. Downey

E. L. Waal

INVENTORS

Hugo J. Ascherin

Raymond W. Loomis,

By R. C. Caldwell

ATTORNEY

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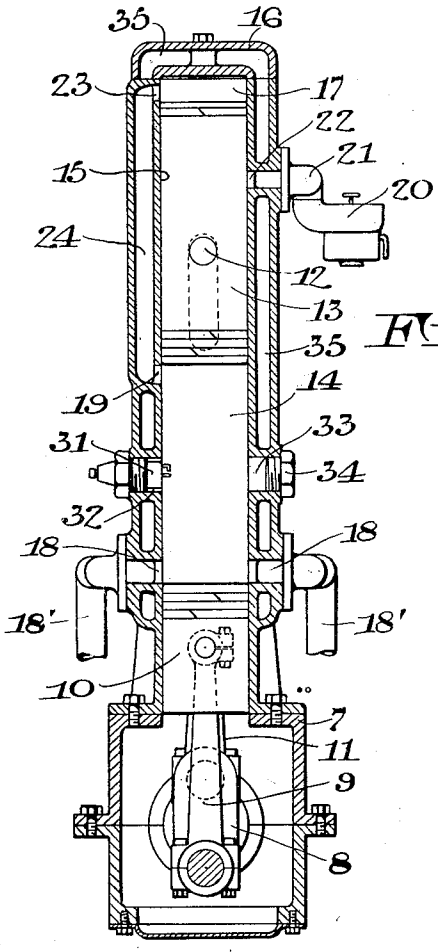

FIG. 3

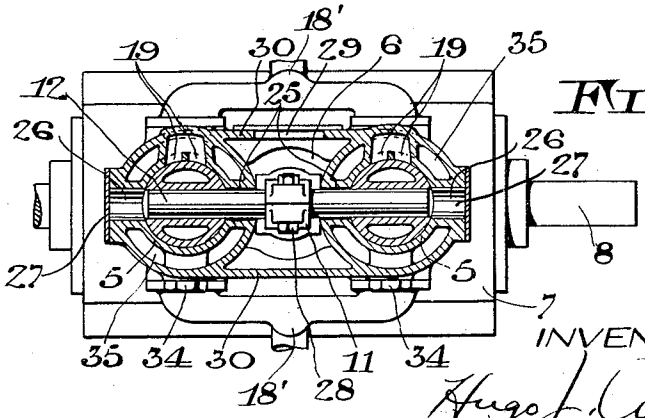

FIG. 4

WITNESSES

H. E. Downey

C. L. Maal

INVENTORS

Hugo J. Ascherin

Raymond W. Loomis,

By C. C. Linwell.

ATTORNEY

Patented July 22, 1924. 1,502,609

UNITED STATES PATENT OFFICE.

HUGO J. ASCHERIN AND RAYMOND W. LOOMIS, OF EAST TROY, WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

Application filed May 17, 1922. Serial No. 561,748.

To all whom it may concern:

Be it known that we, HUGO J. ASCHERIN and RAYMOND W. LOOMIS, citizens of the United States, and residents of East Troy, in the county of Walworth and State of Wisconsin, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

The invention relates to internal combustion engines.

One object of the invention is to provide an internal combustion engine of the two-cycle opposed piston type, and of very compact construction for the power generated, wherein two sets of oppositely moving pistons are connected to and actuated by a single three-throw crank shaft.

A further object of the invention is to provide an internal combustion chamber of the two-cycle opposed piston type in which two sets of opposed pistons are connected to form a power unit with the cylinders formed to provide scavenging chambers to furnish scavenging air to the power cylinders.

With the above and other objects in view the invention consists in the construction and the several features of construction hereinafter described and claimed.

In the drawings: Fig. 1 is a vertical sectional view through an engine embodying the invention; Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a section taken on the line 3—3 of Fig. 1; Fig. 4 is a section taken on the line 4—4 of Fig. 1.

In the drawings the numeral 5 designates cylinders, preferably cast in block, and having a central space 6 between them, said block being mounted on the upper half of the crankcase 7 in which the crank shaft 8 is journalled in the usual manner.

For each power unit the crank shaft has three cranks, two of which are disposed at an angle of 180 degrees with respect to the third crank. The two cranks of the same angularity have connecting rods 9 mounted thereon and operatively connecting them to pistons 10 which work in the lower ends of the cylinders 5. The third or center crank carries a connecting rod 11 connecting it to a wrist-pin 12 and pistons 13 are mounted on opposite ends of the pin 12, one of the pistons 13 working in one cylinder and the other in the other cylinder 5. Thus, with a single three-throw crank shaft the pistons 10 move in opposite directions to the pistons 13 and form with the cylinders 5 a pair of combustion chambers 14. By this arrangement also a well-balanced engine is secured because of the oppositely moving pistons.

The bores 15 of the cylinders 5 are extended for some distance above the combustion chambers 14 and a head 16 covers the upper end of these bores and forms therewith pump chambers 17. The back ends of the pistons 13 work in these chambers 17 and serve to bring the contents thereof to a scavenging pressure when the pistons 13 move upwardly. The pistons 13 are open at their rear ends so that any products of condensed fuel may be permitted to flow onto the relatively hot heads of the pistons 13 in order to be vaporized and consequently be readily mixed with the remainder of the mixture delivered to the combustion chambers 14.

The power unit acts on the two-stroke cycle, there being exhaust ports 18 uncovered by the pistons 10 and inlet ports 19 uncovered by the pistons 13 near the end of their movement, the exhaust ports being uncovered first so as to relieve the pressure of the gases in the chambers 14 prior to scavenging.

For scavenging, the mixture from the carburetor 20 is drawn into the chambers 17 on the downward or compression stroke of the pistons 13 through conduits 21 and the inlet ports 22 which are uncovered by the back ends of the pistons 13 near the end of such stroke, at which time the ports 19 are covered by the pistons 13, as shown in Fig. 1. Discharge ports 23 for the chambers 17 are connected by transfer passages 24 with the scavenge ports 19 so that when the pistons 13 are at the upper end of their stroke the mixture under compression passes from the chambers 17 through ports 23, passages 24 and ports 19, respectively, to the combustion chambers 14, at which time the exhaust ports 18 are uncovered, in the manner previously explained, and the mixture flowing down from the upper end of the cylinder blows out the spent gas through the exhaust pipe 18′.

Adjacent inner sides of the pump chambers 17 are provided with slots 25 in which the wrist-pin 12 moves, and openings 26 are provided in the sides of the cylinders to per-

mit removal or inspection of this wrist-pin on removal of cover plates 27. The small end of the connecting rod 11 is preferably of the split type and the bolt 28 is disposed horizontally so it may be tightened up or loosened through a hand-hole 29 in one of the webs 30 connecting the cylinders 5.

Where an explosive mixture is used ignition is effected by the usual spark plug 31, one for each combustion chamber, extending through an opening 32, a similar opening 33 being provided on the opposite side of each chamber and closed by a removable plug 34, the opening 33 permitting the use of another plug or for inspection of the chambers 14.

From the foregoing description it will be noted that when each set of pistons 10 and 13 is at the greatest distance apart the mixture which has been compressed in each of the chambers 17 during the upward movement of the pistons 13 is introduced into the chambers 14 between the two pistons and then as the pistons move toward each other this charge is compressed and fired near or at the end of compression, and while the charge is being compressed in the combustion chambers new charges are being drawn into the chambers 17.

It will be noted that both the cylinders 5 and the head 16 are provided with a water-jacket space 35 to insure efficient cooling.

We desire it to be understood that this invention is not to be limited to any specific form or arrangement of parts except in so far as such limitations are specified in the claims.

What we claim as our invention is:

1. In an internal combustion engine, the combination of a pair of cylinders, of two pistons working in each of said cylinders in opposite directions and forming combustion chambers therewith, a wrist-pin connecting together the pistons working in one direction in said cylinders, pump chambers in which the back ends of said last named pistons work, a three-throw crank shaft, a connecting rod connecting said wrist-pin with one of the cranks, the other two cranks being disposed opposite to the first mentioned crank, connecting rods respectively connecting the last mentioned cranks with the other pistons, inlet ports at one end of the combustion chambers and exhaust ports at the other end of said chambers uncovered by each set of pistons near the end of the power stroke, inlet ports to said pump chambers controlled by the pistons working therein, and means for transferring the working agent from said pump chamber to the inlet ports for the combustion chambers.

2. In an internal combustion engine, the combination of a pair of cylinders, of two pistons working in each of said cylinders in opposite directions and forming combustion chambers therewith, a wrist-pin connecting together the pistons working in the same direction in said cylinders, a crank shaft having a pair of cranks opposed to a third crank, a connecting rod disposed between the cylinders and operatively connecting said wrist-pin with said third crank, connecting rods connecting the other pistons to the other cranks, inlet and exhaust ports in said chambers controlled by said pistons whereby the working agent is introduced at one end of the combustion chambers and the spent gases exhausted from the other end of said chambers on the outward movement of the pistons, and means for furnishing a scavenging charge to said inlet ports.

3. In an internal combustion engine, the combination of a pair of cylinders having bores disposed in parallel, a head covering one end of said bores, pistons working in the other ends of said bores in the same directions, a crank shaft, connecting rods operatively connecting said pistons to said crank shaft, pistons working between said first named pistons and said head and in an opposite direction from said first named pistons, a wrist-pin connecting said last named pistons together, a connecting rod connecting said wrist-pin with a crank on said shaft at 180 degrees with respect to the other cranks, inlet and exhaust ports at opposite ends of the combustion chambers controlled by the pistons working therein, the spaces between the last named pistons and said head forming pump chambers, inlet ports to said pump chambers controlled by said last named pistons, and transfer passages from said pump chambers to the inlet ports for the combustion chambers.

In testimony whereof we affix our signatures.

HUGO J. ASCHERIN.
RAYMOND W. LOOMIS.