

E. BERLINER.
TWO-CYCLE ROTARY GAS ENGINE.
APPLICATION FILED FEB. 13, 1914.

1,165,059.

Patented Dec. 21, 1915.
2 SHEETS—SHEET 1.

Fig. 7.

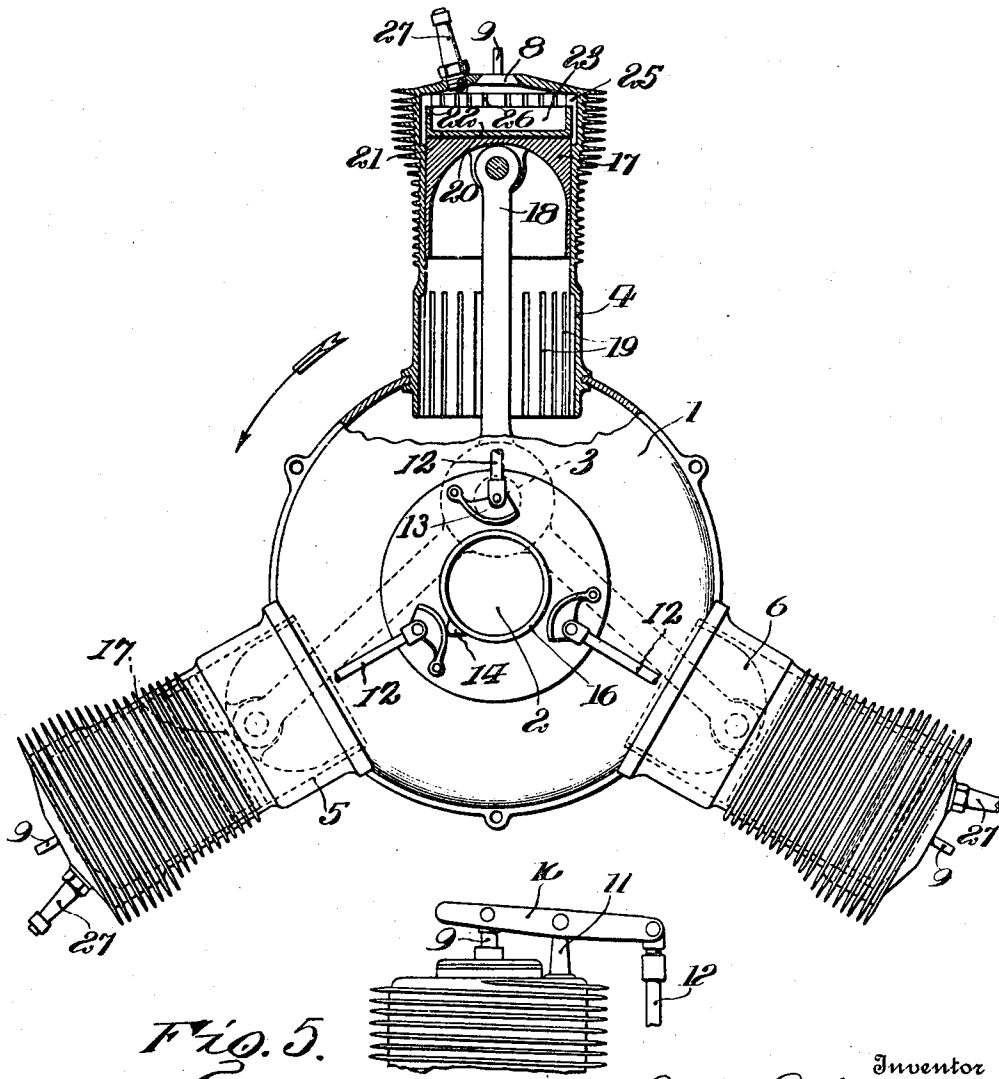


Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

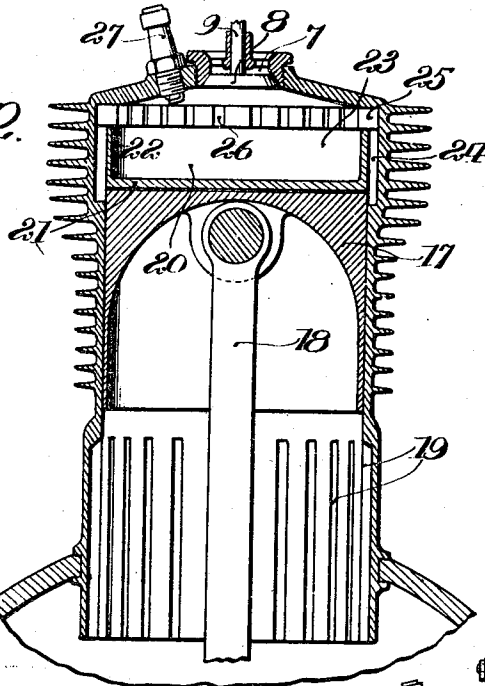


Fig. 3.

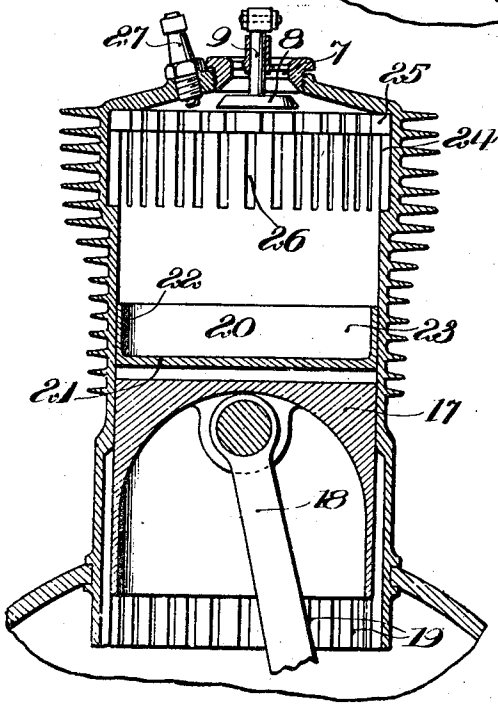
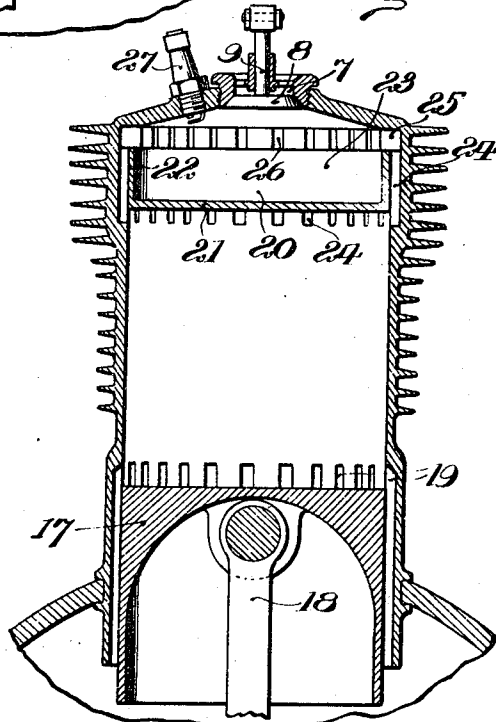


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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TWO-CYCLE ROTARY GAS-ENGINE.

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To all whom it may concern:

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Two-Cycle Rotary Gas-Engines, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in two-cycle combustion engines, and more particularly, to an engine of this type having a rotating cylinder.

An object of the invention is to provide a two-cycle rotary cylinder gas engine with means which may be operated by centrifugal force for positively scavenging the cylinder.

A further object of the invention is to provide a rotary gas engine of the above type wherein a floating piston is operated by centrifugal force for positively forcing the burnt gases from the cylinder, and wherein the working piston uncovers intake ports as it reaches the end of its inward stroke.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings, which show by way of illustration one embodiment of the invention,—

Figure 1 is partly a side view and partly a longitudinal sectional view showing more or less diagrammatically a gas engine embodying the invention. Fig. 2 is a longitudinal sectional view through one of the cylinders showing the piston in position for the ignition of the gases. Fig. 3 is a similar view showing the position of the piston when the exhaust valve is first opened. Fig. 4 is a similar view showing the piston in position for intake and the floating piston having completed the scavenging of the cylinder. Fig. 5 is a detail showing the lever for operating the exhaust valve.

The invention consists, generally, in providing a rotating supporting frame or casing which carries a cylinder. In the cylinder is a piston which has a relative movement therein. The piston at the inner end of its relative movement uncovers in-

take ports which supply the cylinder with the fuel mixture. Located in the cylinder is a floating piston which is free to slide in the cylinder between the piston head and the outer end of the cylinder. This floating piston will, therefore, be operated upon by centrifugal force and normally held thereby at the outer end of the cylinder. By-passes are formed in the cylinder which permit the gases when they are compressed by the piston to pass around the floating piston and to be compressed in the displacement chamber formed between the floating piston and the outer end of the cylinder so that when these gases are ignited, the expansion of the gases will force the floating piston into contact with the working piston of the cylinder, and these parts will move together relative to the cylinder for the working stroke of the engine. As soon, however, as the exhaust valve is opened, the gases are released and the floating piston will be actuated by centrifugal force to positively scavenge the cylinder.

Referring more in detail to the drawings, the engine consists of a supporting casing or frame 1, which is mounted to rotate on a fixed shaft 2, having a crank 3, the position of which is indicated in dotted lines in Fig. 1. As herein shown, this supporting frame or casing carries three cylinders 4, 5 and 6. These cylinders are alike in construction and are secured to the supporting frame or casing in a suitable way. Each cylinder is formed with an exhaust port 7 at its outer end, which is closed by a valve 8. The valve 8 is carried by a valve stem 9 which is pivoted to a lever 10, fulcrumed to a bracket 11, on the outer end of the cylinder. A rod 12 connected to the other end of the lever is in turn pivotally attached to a pivoted arm 13, and this arm 13 has an operating face adapted to coöperate with a cam 14 on a fixed sleeve 16. The fixed sleeve 16 is so located relative to the supporting casing that the cam 14 operates in proper timing to release the exhaust valves of the various cylinders.

Each cylinder is provided with a piston 17 which has a relative movement in the cylinder. The piston is pivotally connected to

a piston rod 18 which in turn is pivotally connected to the crank 3. The piston rod of each of the cylinders is connected to this crank. The cylinder on its inner face adjacent its inner end is provided with a plurality of longitudinally extending grooves 19. These grooves are so disposed that when the piston is at the inner end of its movement relative to the cylinder as shown in Fig. 4, said piston uncovers the upper ends of the grooves, and these grooves form passages connecting the cylinder with the casing 1 which supports the cylinder. The casing 1, as herein shown, carries the fuel supply chamber from which the mixed gases are delivered to the cylinders. These passages formed by the grooves 19 are intake ports which are uncovered by the piston. Also located in each cylinder is a floating piston 20. This floating piston consists of a disk or head 21 which is formed with an outwardly projecting cylindrical flange 22 adapted to close fit the inner wall of the cylinder. The flange on the head forms a chamber 23. The cylinder wall adjacent its upper end is formed with longitudinal grooves or recesses 24.

An integral ring 25 is cast in the cylinder and forms a stop for the outward movement of the floating piston. These grooves 24 are continued through the ring 25, as indicated at 26. A spark plug 27 is threaded into the outer end of the cylinder.

The operation of the device is as follows:
 35 When the parts are positioned as in Fig. 2, the exhaust valve is closed and the gases are compressed in a displacement chamber at the outer end of the piston and the chamber 23 in the floating piston. Upon the ignition of the gases, the expansion of the same will force the floating piston 20 and the working piston 17 inwardly relative to the cylinder moving these two pistons as one. When the piston head reaches the relative position shown in Fig. 3, which is approximately two-thirds of its stroke relative to the cylinder, the exhaust valve 8 is opened and upon the release of the gases in the cylinder the centrifugal force acting on the floating piston due to the rotation of the cylinder will cause said floating piston to be separated from the working piston, as shown in Fig. 3, and this floating piston will at once be moved outwardly in the cylinder, positively forcing the burnt gases out through the exhaust valve and thus positively scavenging the cylinder. The working piston 17 continues its relative movement in the cylinder to the inner end of its stroke, which is shown in Fig. 4. At this position the intake ports are uncovered and the mixed gases at once rush into the cylinder, partly due to the vacuum formed therein

by the closing of the exhaust valve before the piston reaches the inner end of its stroke 65 and partly by centrifugal force and the outward movement of the working piston relative to the cylinder will compress the gases. Inasmuch as the floating piston, when positioned as shown in Fig. 2, uncovers the lower 70 ends of the by-passes or grooves 24, the gases will be forced by the piston through these by-passes around into the chamber 23 in the floating piston and the displacement chamber at the end of the cylinder. The 75 gases will all be compressed in these chambers, and the working piston, at the outer end of its stroke, will be substantially as shown in Fig. 2. This completes the cycle and the gases are now compressed ready for 80 firing.

In Fig. 1 of the drawings, the gas engine is shown as having three cylinders. It will be understood, however, that the number of cylinders may be varied, as desired. The 85 cylinder indicated at 4 is in position for firing. The cylinder indicated at 5 is in position for exhaust and as the exhaust valve is opened at this time the floating piston will positively scavenge the cylinder. The cylinder 90 6 shows the floating piston at the outer end of the cylinder and the piston is moved outwardly relative to the cylinder to compress the gases.

When the floating piston moves outwardly 95 to scavenge the cylinder, the exhaust valve may, if desired, be timed so as to close just before the floating piston reaches the end of its stroke and thus trap the gases so as to form a cushion for said floating piston. It 100 is obvious that other means may be provided for cushioning the upward movement of the floating piston.

The structure herein illustrated and disclosed is solely for the purpose of describing 105 one embodiment of the invention and it is obvious that changes in the details of construction and arrangement of parts may be made without departing from the spirit of the invention as set forth in the appended 110 claim.

Having thus described my invention, what I claim is:

A two-cycle gas engine including a rotating supporting casing, a plurality of cylinders carried thereby, each cylinder having 115 a valve controlled exhaust port at its outer end, a piston for each cylinder, each cylinder having a plurality of grooves extending longitudinally thereof at the inner end 120 thereof and forming intake ports for connecting said casing with the cylinder when the piston is at the inner end of its stroke, a floating piston in each cylinder free to move by centrifugal force for scavenging 125 the cylinder, said cylinder at its outer end

having annular stop shoulders for arresting the movement of the floating piston due to the action of centrifugal force thereon, the walls of said cylinder and the stop shoulder
5 having longitudinal grooves formed therein providing by-passes which permit the gases to be forced by the working piston into the chamber between the floating piston and the

outer end of the cylinder and compressed therein.

In testimony whereof, I affix my signature in the presence of two witnesses.

EMILE BERLINER.

Witnesses:

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A. M. PARKINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."