J. G. SNYDER.

ENGINE.

APPLICATION FILED MAR. 23, 1911.

1,043,546. **Patented Nov. 5, 1912.**

2 SHEETS—SHEET 1.

Fig. 1.

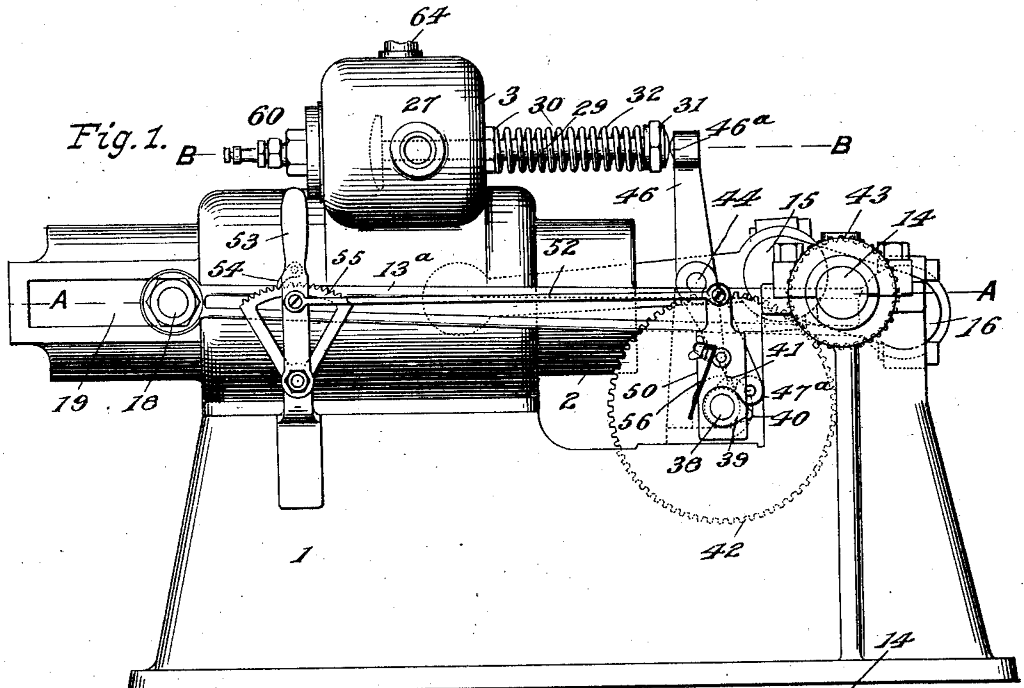
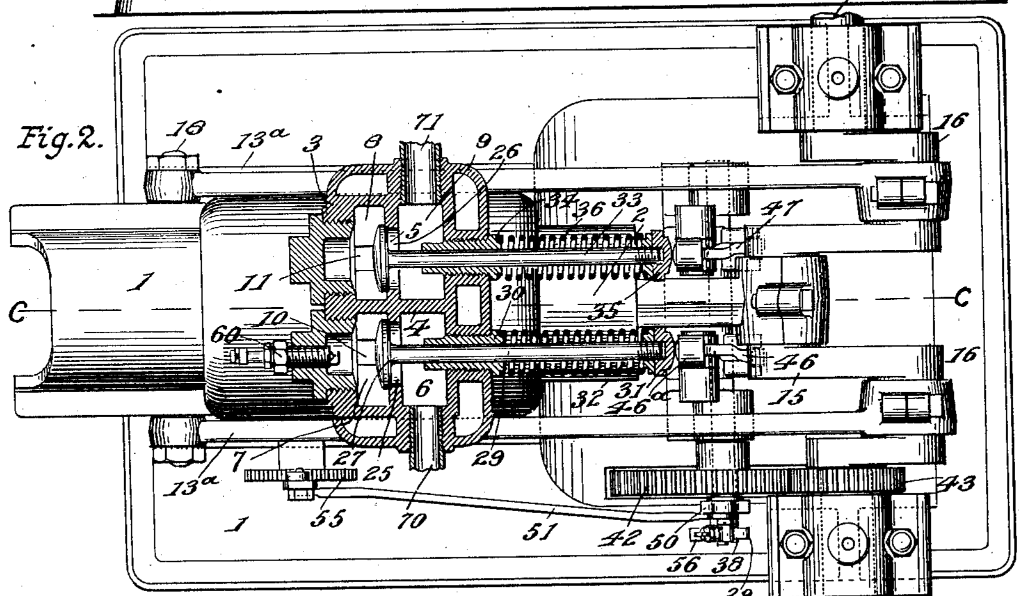


Fig. 2.



Witnesses,

Charles Seekirk

W. A. Williams

John G. Snyder.
Inventor,

by Jno Munie
Attorney.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 3.

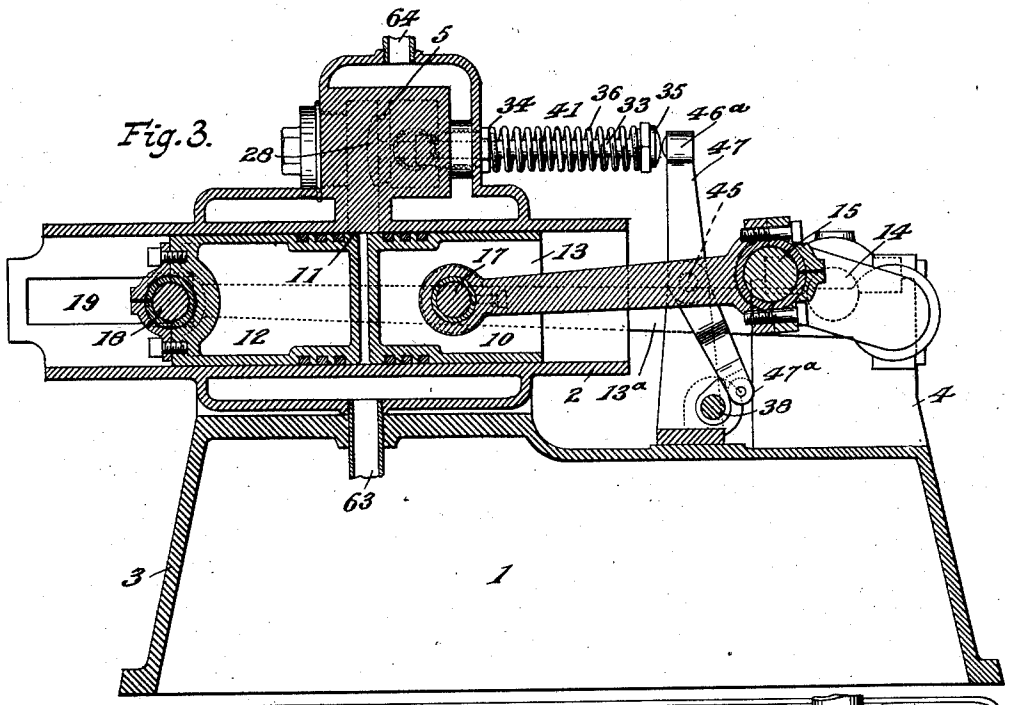
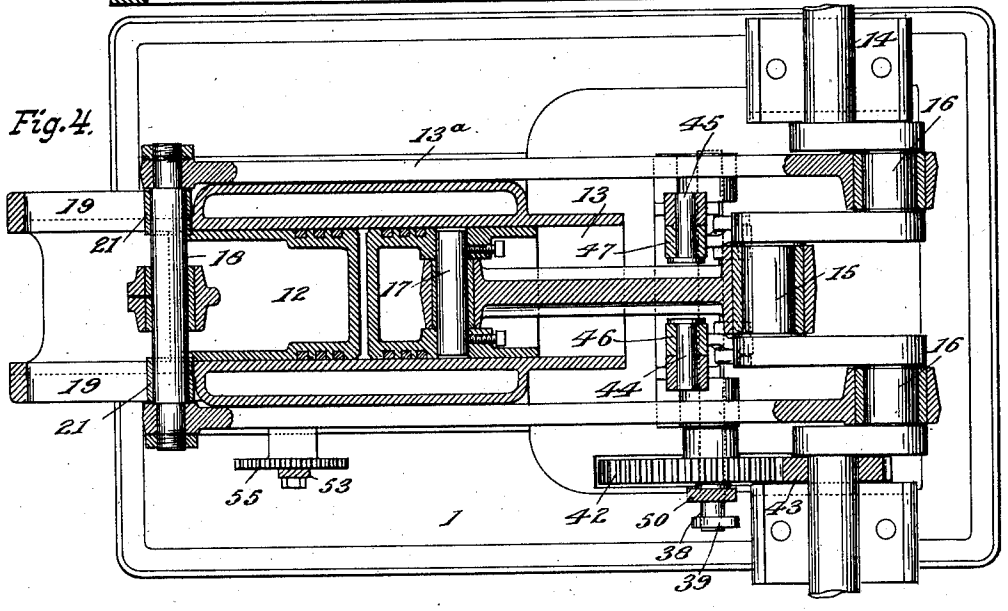


Fig. 4.



Witnesses,

Charles Seekirk

W. W. Williams

John G. Snyder,
Inventor,

by Jno. Imrie
Attorney.

UNITED STATES PATENT OFFICE.

JOHN G. SNYDER, OF GREEN ISLAND, NEW YORK.

ENGINE.

1,043,546. Specification of Letters Patent. Patented Nov. 5, 1912.

Application filed March 23, 1911. Serial No. 616,402.

To all whom it may concern:

Be it known that I, JOHN G. SNYDER, a citizen of the United States, residing at Green Island, in the county of Albany and State of New York, have invented certain new and useful Improvements in Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in gasolene or vapor engines of the throttling governor type, the pistons having a reciprocating movement in opposite direction in the same cylinder.

The object of the invention is to provide a perfectly balanced engine without vibration in direction of its stroke.

A further object of the invention is to provide means for reciprocating a pair of pistons toward and from each other, whereby to receive a charge between the heads of the pistons, compress the charge and ignite it, and subsequently exhaust it.

The invention also relates to the specific details of construction to perform the functions above noted.

The invention also comprehends improvements in the construction and arrangement of parts which will be hereinafter described, and particularly pointed out in the claim.

Figure 1 is a side elevation of my improved engine. Fig. 2, is a horizontal section on the line B—B, Fig. 1. Fig. 3 is a central vertical section on the line C—C, Fig. 2. Fig. 4 is a horizontal section on the line A—A, Fig. 1.

The same numerals refer to like parts in all the figures.

1 indicates a base, on which is mounted a horizontally disposed cylinder 2, which is open at both ends. Extending from the upper part of the cylinder 2, is a casing 3, provided with a longitudinal partition 4, and a transverse partition 5, to form a gas inlet chamber 6, a gas passage 7, an exhaust passage 8, and an exhaust chamber 9. The gas passage 7, and the exhaust passage 8, communicate by means of ports 10 and 11 with the cylinder at approximately the center of the latter. Operating in the cylinder are two pistons 12 and 13 designed to travel toward and away from each other, according to the position of the parts.

Mounted in bearings in the base 1, is a crank shaft 14, provided with a central crank 15, and two diametrically arranged side cranks 16—16, disposed each side the central crank 14. A pitman rod pivotally connects the central crank 14, with a transverse pin 17, secured in the forward piston 13. Parallel pitman rods 13ª, pivotally connect the side cranks 16—16. and the ends of a transverse rod 18, mounted in the rear piston 12. The rod 18, projects through guide slots 19, formed in an extension of the cylinder, and is provided with anti-friction rollers 21, to relieve the friction when the engine is in operation. By reason of the disposition of the cranks the two pistons will receive the same motion, but in opposite directions.

The transverse partition 5 in the casing 3 is formed with two ports 25 and 26 for the inlet and outlet of the gas, and these openings are controlled by two valves 27 and 28. The inlet valve 27 has a stem 29, which extends through a stuffing box 30, between which and a head 31, is a coiled spring 32, which normally closes the port 25. The valve 28, has a stem 33, which extends through a stuffing box 34, between which and a head 35 is a coil spring 36, which serves to normally close the exhaust port 26.

Mounted in suitable bearings in the base 1, is a cam shaft 38 provided with three cams 39, 40 and 41, and a gear wheel 42, the latter meshing with a smaller gear wheel 43, mounted on the crank shaft 6.

Mounted in bearings supported on the base 1, and some distance above the cam shaft 38, are two stub shafts 44 and 45, on which are pivotally mounted two levers 46 and 47, each of which is formed at its upper end with an operating head 46ª, and at its lower end with a roller 47ª. The head 46ª, of the lever 46 is in contact with the head 31 on the stem of the inlet valve 27 and its roller 47ª is in contact with one of the cams. The head of the lever 47 is in contact with head 35 on the stem of the exhaust valve 28 and the roller 47ª is in contact with the cam 41. The two cams 40 and 41 are set slightly in advance of the other so as to operate the inlet and exhaust valves at the proper time as will appear later on.

Pivotally supported on the cam shaft 38 is a plate 50, connected by a link 52, with a

hand lever 53, having a pawl 54, coöperating with a toothed segment 55. On the plate 50, is secured a spring contact finger 56, which is located in the path of movement of the cam 39. A wire is connected to the spring finger 56 and batteries and spark coil (not shown) for making electrical connection when the cam 39 contacts with the finger 56. In the gas inlet passage 7 is a spark plug 60, connected by a wire, with the usual batteries and spark coil. The cylinder and casing are provided with a water jacket 62, water entering a lower pipe 63, and passing out through an upper pipe 64.

Assuming the parts to be in the position shown in the drawings, wherein the pistons are moved toward each other and a charge of gas is about to be taken in as the shafts revolve the cam 40 will contact with the roller 47ª and rock the lever 46 and operate the inlet 27 and as the pistons spread apart a vacuum will be created and a charge of vapor will be sucked in the inlet pipe 70. When the pistons have about completed their limit of outward movement, the cam 40 will have swept past the roller 47ª, and the spring 32 will close the valve, and upon the reverse movement of the pistons toward each other the charge in the cylinder will be compressed. At the time of complete compression, or at the limit of the inward movement of the pistons, the cam 39 contacts with the spring finger 56 and a spark is formed at the plug 60 and the compressed charge is exploded and drives the pistons apart. Upon the next inward movement of the pistons, the cam 42 contacts with the roller 47ª and rocks the lever 47 which causes the head thereof to open the exhaust valve 28 and the spent gases pass through the exhaust passage 8, port 26, exhaust chamber 9, and to the atmosphere through a pipe 71. This came cycle of operation is continued and as the crank shaft 6, is revolved, the explosion of a single charge will be sufficient to first force the pistons apart, secondly, bring them together; thirdly, spread them apart a second time; and fourthly, bring them together again, for completing the various operations just described.

An engine constructed as described is extremely simple, and as the parts are arranged so as to positively operate with one another, a durable and effective engine is produced. The pistons and valves are substantially balanced, which makes it possible to obtain the greatest economy and great power.

What I claim is:—

An engine including a base, a longitudinal cylinder mounted thereon, oppositely acting pistons arranged in the cylinder, a crank shaft mounted on the base and formed with oppositely-disposed cranks connected with the pistons, a cam shaft mounted on the base below the plane of the crank, an inlet cam, an exhaust cam and a sparking cam mounted on said cam shaft, a casing mounted on the cylinder and divided by a longitudinal partition to provide inlet and exhaust spaces in said casing and by a transverse partition to divide each of said spaces into an open chamber and a closed chamber, an inlet fuel pipe communicating with the open chamber in one space, an exhaust pipe communicating with the open chamber of the other space, a valve controlling communication between the closed and open chambers of each space, connections for operating said valves from the inlet and exhaust cams of said cam shaft, the closed chamber of each space being in communication with the cylinder, a spark plug arranged in the closed chamber of one of said spaces, and means for controlling the sparking of said plug from the spark cam on the cam shaft.

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

JOHN G. SNYDER.

Witnesses:
JOHN B. HOLMES,
EUGENE BRYAN.