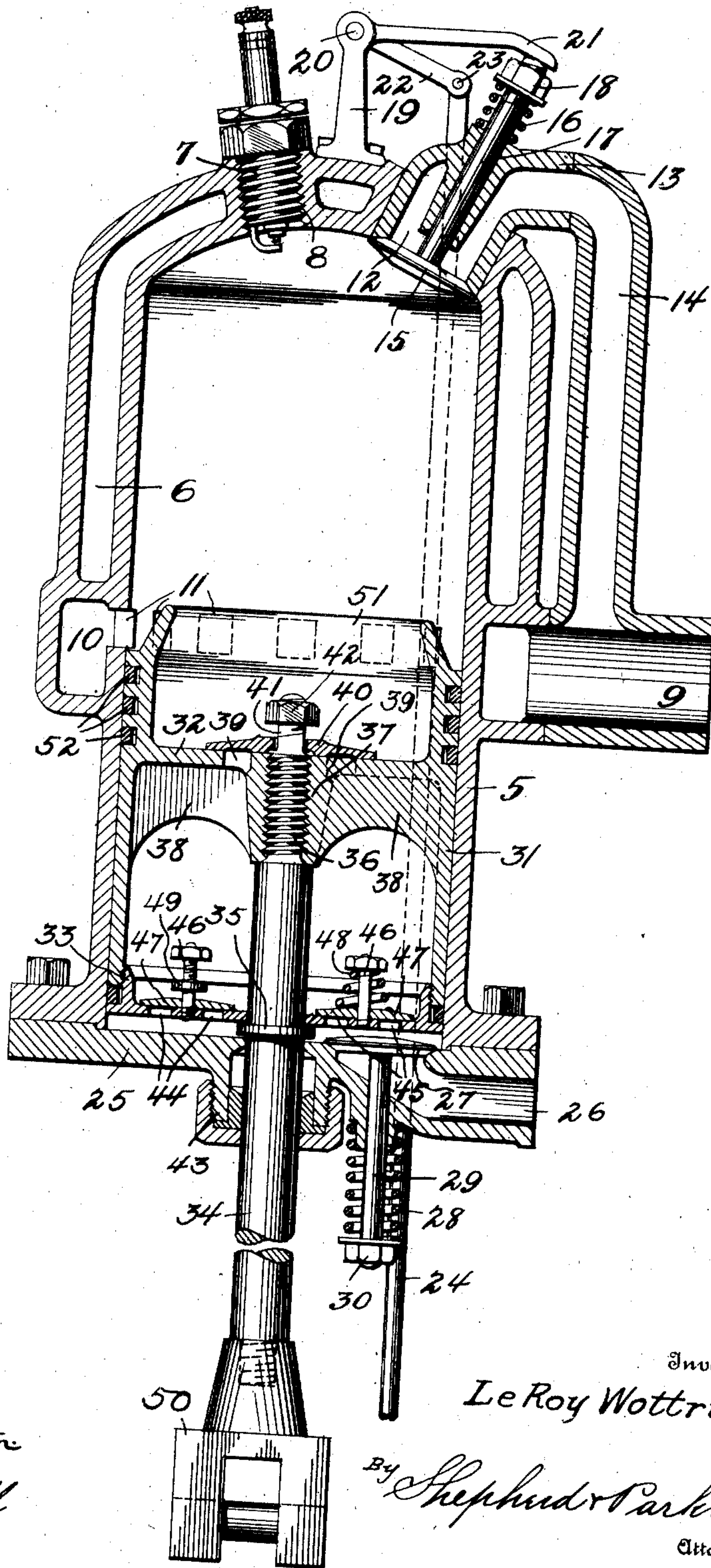


No. 864,586.

LE ROY WOTTRING,
GASOLENE ENGINE.
APPLICATION FILED SEPT. 17, 1906.

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Witnesses
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UNITED STATES PATENT OFFICE.

LE ROY WOTTRING, OF PROSPECT, OHIO.

GASOLENE-ENGINE.

No. 864,586.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LE ROY WOTTRING, a citizen of the United States, residing at Prospect, in the county of Marion and State of Ohio, have invented certain
5 new and useful Improvements in Gasolene-Engines, of which the following is a specification.

My invention relates to gas engines of the type known as two-cycle engines and has for its object the provision of an engine of this character constructed in
10 such manner as to secure efficient compression of the charge without utilizing the crank case for the compression of said charge.

It is a well known fact that where the charge is compressed in the crank case, stuffing boxes must be provided about the engine shaft in order to render the
15 crank casing fluid tight. These stuffing boxes increase the friction about the engine shaft and are the source of much annoyance.

A further objection to compressing the charge in the crank case, is that the crank case is of such large area that a high degree of compression cannot be secured. It is to obviate these difficulties that the present invention is particularly designed.

A further object of the invention is the provision of an engine of this character constructed in such manner that the degree of compression secured will automatically increase with the speed of the engine.

A further object of the invention is the provision of an engine of this character having exhaust ports adapted to be uncovered by the piston as said piston reaches its lowest point of movement and also having
30 an auxiliary exhaust port located in the upper end of the cylinder.

Further objects and advantages of the invention will be set forth in the detailed description which now follows.

In the accompanying drawing the figure illustrates a longitudinal vertical section of an engine cylinder constructed in accordance with the invention, the
40 piston being illustrated at its lowest limit of movement.

Referring to the drawing, the numeral 5 designates the cylinder of an engine which may employ gas, gasolene, alcohol or other like explosive as a fuel. This
45 cylinder is preferably provided with a water jacket 6, in the usual and well known manner. A spark plug 7 is threaded into the cylinder as at 8. An exhaust pipe 9 communicates with an exhaust port 10 which extends entirely around the cylinder, a plurality of
50 smaller exhaust ports 11 providing communication between the interior of the cylinder and the exhaust port 10. An auxiliary exhaust port 12 is formed in a

casting 13. An auxiliary exhaust pipe 14 establishes communication between the exhaust port 12 and the exhaust pipe 9. A valve 15 normally closes the ex- 55
haust port 12 under the influence of a spring 16, the stem 17 of said valve being slidably disposed in the casting 13. A nut 18 is threaded upon the upper end of this stem and the spring 16 bears between said nut and the outer face of the casting 13. A bracket 19 is 60
bolted to the head of the cylinder and supports a shaft 20. Mounted upon this shaft are the arms 21 and 22. The free end of the arm 21 overlies the end of the valve stem 17, while the free end of the arm 22 is pivoted as at 23 to a rod 24. This rod is adapted to actuate the 65
exhaust valve 15 when motion is imparted to said rod from the engine shaft by means of an eccentric or cam, or in any other manner, this method of actuating the exhaust valves of engines of this character being well known in the art and forming no part of the present 70
invention.

In contradistinction to the usual construction of engines of this character, the lower end of the cylinder 5 is closed by a head 25. An intake port 26 is formed in this head and leads to a carbureter, not shown. An 75
intake valve 27 normally closes this intake port under the influence of a spring 28, the stem 29 of said valve bearing between a nut 30 and the head 25. A hollow piston 31 is slidably disposed within the cylinder 5. This piston is provided with a head 32 and is closed at 80
its lower end by a head 33 which is threaded into the lower end of said piston. A piston rod 34 carries a collar 35 which bears against the head 33, when the upper end of said piston rod, which is threaded as at 36, is screwed into a threaded boss 37 which is carried 85
by the head 32. Ribs 38 strengthen and brace this head. Ports 39 are formed through the head 32. A valve 40 is loosely mounted upon an extension 41 of the piston rod, the upward movement of said valve being limited by a nut 42 which is threaded upon said 90
extension. A stuffing box 43 is provided at the point at which the piston rod 34 passes through the head 25. This stuffing box is of the usual and well known construction and requires no further description. Ports 44 and 45 are formed through the head 33 of the piston. 95
Studs 46 are threaded into the head 33. Valves 47 are mounted to slide upwardly upon these studs. These valves may be held down under a spring tension provided by a spring such as is indicated at 48 or this spring may be omitted and the upward movement of 100
the valve limited by a collar 49.

Usually engines of this character have not been provided with a piston rod, but the upper end of the connecting rod has been pivoted to the piston and the

lower end of the connecting rod has been secured to the crank of the engine. The closure of the bottom of the cylinder by the head 25, however, renders it necessary to provide the piston rod 34. To the lower end of this piston rod a cross head 50 is secured, said cross head being adapted to slide in ways, not shown, in the manner in which the cross head of a steam engine slides in ways. It is readily apparent that a connecting rod may be connected to this cross head. The details of construction necessary to connect this cross head to the engine shaft by a connecting rod, are familiar to any one skilled in the art, the present invention residing particularly in the provision of the hollow piston and the cylinder closed at the lower end, together with the various valves and other mechanism described. An annular baffle flange 51, the walls of which incline inwardly, is carried by the upper portion of the hollow piston. Packing rings 52 are also provided about said piston.

The operation of the device is as follows: Upon the up-stroke of the piston, a charge is drawn into the lower portion of the cylinder through the intake port 26, the valve 27 lifting to permit this charge to enter. Upon the down-stroke of the piston this valve closes and the valves 47 lift to permit said charge to enter the interior of the hollow piston. After the engine has been given a revolution or two by hand, sufficient of the explosive mixture will have accumulated in the hollow piston to lift the valve 40 upon the down-stroke of the piston. The explosive charge then passes into the upper portion of the cylinder, where upon the up-stroke of the piston it is compressed and fired in the usual manner. After the engine starts to fire, the up-stroke of the piston draws the explosive mixture in the lower portion of the cylinder. Upon the down-stroke of the piston the explosive mixture enters the hollow piston and is compressed in said hollow piston until the piston in its downward movement uncovers the exhaust ports 11, this relieves the pressure upon the valve 40 and permits said valve to lift. Simultaneously with the lifting of said valve, the exhaust valve 15 is opened. The upward rush of the incoming charge drives the burned gases through the exhaust port 12 and pipe 14 to the exhaust 9. The valve 15 is, however, permitted to remain open but a very short time, said valve closing before the incoming charge reaches it. Since the deflector flange 51 directs said charge to the center of the cylinder, it follows that the burned gases will be driven down the walls of the cylinder and out of the exhaust ports 11. Upon the upward movement of the piston, the explosive mixture which is thus passed into the upper portion of the cylinder is compressed and fired and this operation is continued indefinitely.

It will be seen that the present invention provides means for automatically increasing the pressure in the hollow piston as the speed of the engine increases. When an engine of this character is running at a very high rate of speed, it will of course be understood that the various operations must be carried out with great rapidity.

If the pressure of the mixture within the hollow piston is not sufficiently great to force a fresh charge into

the upper portion of the cylinder with sufficient rapidity, this pressure will be automatically increased with the present construction. This is accomplished in the following manner: Assuming that ten pounds pressure is the proper pressure to exist in the upper portion of the cylinder at the beginning of the up-stroke of the piston and assuming that when the engine is running at a slow rate of speed, ten pounds of pressure will exist within the hollow piston, which pressure passes into the upper portion of the cylinder when the valve 40 lifts, if, now the speed of the engine should increase to such an extent that with ten pounds of pressure in the hollow piston the charge cannot pass quickly enough into the upper portion of the cylinder, it follows that some of said charge will be left in the hollow piston. If, for instance at the beginning of the up-stroke of the piston only a portion of the charge has had time to pass into the upper portion of the cylinder and two pounds pressure are left in the hollow piston, this two pounds pressure will be confined in said hollow piston, said pressure holding the valve 47 closed. Upon the up-stroke of the piston the usual amount of explosive mixture will be drawn into the lower portion of the cylinder. Upon the down-stroke of the piston this explosive mixture will be forced into the interior of the hollow piston and will be added to the two pounds pressure which remain in said piston from the preceding charge, raising the pressure in said piston to twelve pounds. This action will continue until the pressure in the piston is sufficient to force a full charge of explosive mixture into the upper portion of the cylinder, no matter what the speed of the engine may be. By compressing the charge in the lower portion of the cylinder and storing it in the piston instead of compressing it in the crank case, I am enabled to compress said charge in a comparatively small space and consequently am enabled to secure a high degree of compression when the engine is running at a high speed.

It is apparent that an operative structure would be provided even though the valves 47 were omitted, for the charge would then be compressed against the head 25 until the exhaust ports 11 were opened, when the charge would begin to pass to the upper portion of the cylinder.

It is to be understood that the present invention is applicable to gas, gasoline, alcohol, or other explosive engines, but while the elements herein shown and described are well adapted to serve the purpose for which they are intended, it is to be understood that my invention is not limited to the precise construction set forth, but includes within its purview such changes as may be made within the scope of the appended claims.

What I claim, is:

1. In a device of the character described, the combination with a gas engine cylinder, of a head which closes the lower end of said cylinder, a fuel conduit leading to the lower portion of the cylinder, a check valve located in said fluid conduit and opening inwardly, a hollow piston slidably disposed in the cylinder, said piston having heads which close its upper and lower ends, a check valve opening inwardly which is carried by the lower head, and a check valve opening outwardly which is carried by the upper head.

2. In an engine of the character set forth, the combination with a cylinder closed at its lower end, of means for

conducting a fluid fuel to the lower end of the cylinder, a valve controlling the admission of said fuel to the lower end of the cylinder, a piston mounted in the cylinder, a piston rod connected to said cylinder and projecting through the closed lower end of the cylinder, a valve carried by the piston head, said valve opening outwardly, a deflecting member located above said valve, the walls of which incline inwardly, and an exhaust chamber which extends around the cylinder there being a series of exhaust

ports arranged circumferentially entirely around the cylinder all of which communicate with said exhaust chamber. 10

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

LE ROY WOTTRING.

Witnesses:

S. L. WOTTRING,
S. H. TRUSE.