G. W. SHOEMAKER.

HYDROCARBON ENGINE.

APPLICATION FILED DEC. 18, 1916.

1,245,808. Patented Nov. 6, 1917.

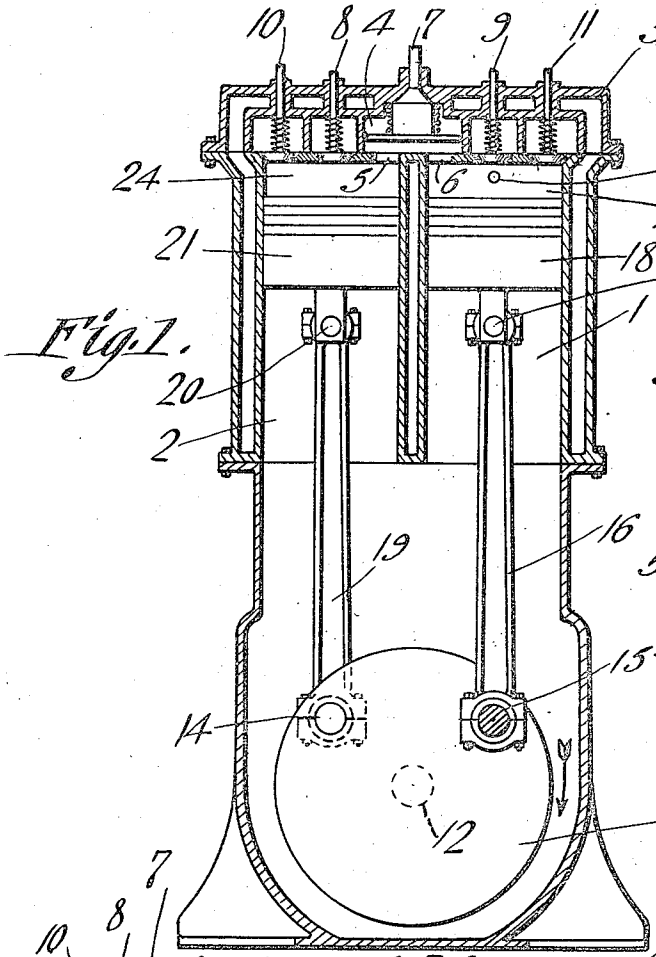


Fig. 1.

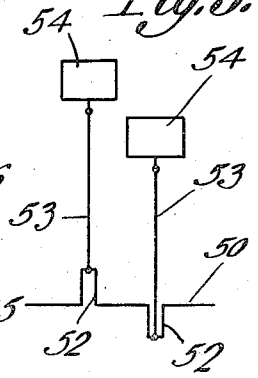


Fig. 5.

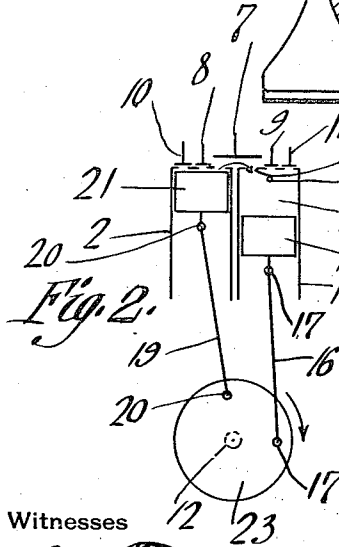


Fig. 2.

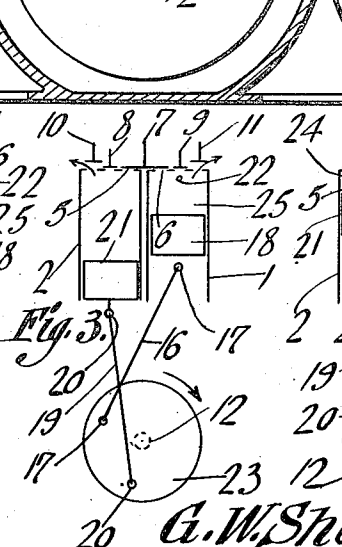


Fig. 3.

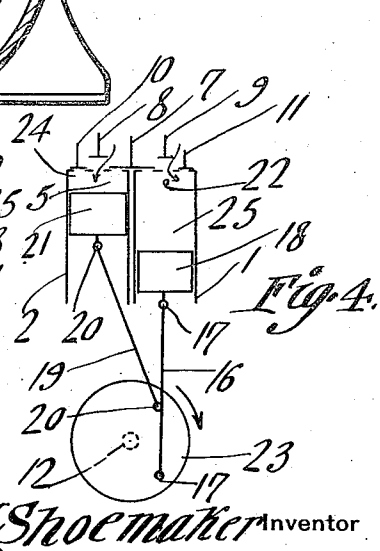


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-ENGINE.

1,245,808. Specification of Letters Patent. Patented Nov. 6, 1917.

Application filed December 18, 1916. Serial No. 137,659.

To all whom it may concern:

Be it known that I, GEORGE W. SHOEMAKER, a citizen of the United States, residing at Dalton, in the county of Lackawanna and State of Pennsylvania, have invented a new and useful Hydrocarbon-Engine, of which the following is a specification.

One object of the present invention is to provide novel means whereby, in an internal combustion engine, the pressure of the expanding gas will be applied to the crank at such a point as to have a maximum moment with respect to the crank shaft.

Another object of the invention is to provide novel means for controlling the passage of the explosive fluid through the engine, from one cylinder of the engine to the other.

Another object of the invention is to provide a device of the type described in which the pistons travel the full length of the cylinder, toward the cylinder head, thereby to expel all of the burnt gas after an explosion stroke has been made.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in vertical section, an engine embodying the present invention; and

Figs. 2, 3 and 4 are diagrams illustrating the operation of the structure;

Fig. 5 is a diagrammatic view illustrating a slightly modified form of the invention.

The engine forming the subject matter of this application includes a cylinder 1 and a cylinder 2. The cylinders 1 and 2 are provided with a head 3 having a chamber 4. A port 5 leads from the chamber 4 to the upper end of the cylinder 2, and a port 6 leads from the chamber 4 to the upper end of the cylinder 1. The ports 5 and 6 are controlled by a spring actuated valve 7, adapted to open, at times, under pressure. The cylinder 2 has an intake valve 8, and the cylinder 1 is provided with an intake valve 9. The exhaust valve of the cylinder 2 appears at 10, and the numeral 11 denotes the exhaust valve of the cylinder 1.

The numeral 12 denotes a crank shaft carrying disks 23 provided with cranks 14 and 15. A pitman 16 is pivoted at its lower end on the crank 15 and is pivoted at its upper end as shown at 17 to a piston 18 operating in the cylinder 1. A pitman 19 is pivoted to the crank 14 and is pivoted as shown at 20 to a piston 21 operating in the cylinder 2. The numeral 22 indicates any suitable means, such as a spark plug, for exploding a charge in the cylinder 1 on top of the piston 18.

The cranks 14 and 15 are so placed on the disks 23 that when these cranks are in a horizontal plane as shown in Fig. 1, the pistons 21 and 18 will be spaced slightly from the head 3. The distance between the pistons 18 and 21 and the head 3 when the cranks 14 and 15 are in horizontal alinement as shown in Fig. 1, will depend upon the amount of compression desired during certain operations which will be set forth hereinafter. The pitmen 16 and 19 are of such a length, and the cranks 14 and 15 have such a throw that when these cranks are at the limit of their upward travel, the pistons 21 and 18 will be as close as possible to the head 3. Theoretically, there is no clearance at all at these points, but practically, there may be a clearance of one sixty-fourth of an inch or less, the sole object in view being to prevent the pistons 18 and 21 from knocking against the head 3 as the pistons move upwardly. Owing to the construction above described, the pistons 18 and 21 move upwardly throughout the entire length of the cylinders 1 and 2, and the burnt gases are completely expelled, as will be made manifest hereinafter.

Let it be supposed that the cranks 14 and 15 are in horizontal alinement as shown in Fig. 1, and that the pistons 21 and 18 are in horizontal alinement also. Let it be supposed that the crank shaft 12 and the disks 23 are rotating in a clockwise direction as indicated by the arrows. The piston 21 moves upwardly until its upper end is as close to the lower surface of the head 3 as is possible without knocking. Theoretically there is no clearance at all at this point. Practically, there may be one-sixty-fourth

of an inch or even less of clearance between the pistons 18 and 21 and the head 3. When the piston 21 has moved upwardly until it is closely adjacent the head 3, the crank 14 has moved upwardly until it is at the top of its vertical throw. At the same time, the piston 18 has moved downwardly until the crank 15 is substantially in a common horizontal plane with the crank shaft 12. The charge in the chamber 24 of the piston 21 has been compressed by the upward movement of the piston 21, the valve 7 has been lifted by compression, the charge in the chamber 24 has been forced over into the chamber 25 above the piston 18, through the port 5, the chamber 4 and the port 6, and has been added to the charge in the chamber 25, and as the piston 21 has been moved upwardly until the capacity of the chamber 24 has been reduced practically to nothing, the entire contents of the chamber 24, has been delivered over in the chamber 25. The parts appear in Fig. 2 substantially in the positions described. The charge in the chamber 25 is now exploded by the plug 22 or otherwise, and the piston 18 makes a downward power stroke. At this point it should be noted that the explosive force in the chamber 25 is applied to the piston 18 at a time when the crank 17 is approaching a horizontal plane passing through the crank shaft 12. By this operation the explosive thrust on the piston 18 is given a maximum moment so far as its effect on the crank shaft 12 is concerned.

The piston 18 now continues to make a downward power stroke from the position of Fig. 2, and, after the crank 20 passes a vertical plane running through the crank shaft 12, the piston 21 moves downwardly. The expanding explosive charge in the chamber 25 flows back by the port 6, the chamber 4 and the port 5 into the chamber 24 and exerts a downward pressure on the piston 21 when the latter moves downwardly.

The piston 18 now moves upwardly in advance of the piston 21. The parts are thus shown in Fig. 3. The exhaust valves 10 and 11 open, and the exhaust in the chambers 24 and 25 is scoured out, it being noted at this point that the pistons 21 and 18 move to the extreme upper ends of their respective cylinders.

The pistons 18 and 21 now move downwardly, as shown at Fig. 4, and fresh charges are sucked into the chambers 25 and 24 through the valves 9 and 8. The pistons 18 and 21 now move upwardly. The piston 18, moving in advance of the piston 21 first forces the entire charge over into the cylinder 2 and into the chamber 24. Subsequently, the parts assume the positions of Fig. 1, and then assume the positions of Fig. 2, the charge being returned to the chamber 25 in the cylinder 1, and the cycle above described being repeated.

In Fig. 5 of the drawings, the crank shaft is shown at 50, and the cranks thereof appear at 52, the numeral 53 denoting the pitmen which are connected with the pistons 54. The only change contemplated is that the shaft 50 is disposed at right angles to the shaft 12, with respect to the cylinders and their pistons.

Having thus described the invention, what is claimed is:—

An internal combustion engine embodying cylinders; intake and exhaust valves for the cylinders; a chamber having ports communicating with both cylinders; a valve cooperating with both ports and movable to an open position under compression in either cylinder; pistons working in the cylinders; a shaft having cranks; and pitmen connecting the cranks with the pistons, the throw of the cranks being sufficient to move the pistons completely to the outer ends of the cylinders, the pistons being spaced at equal distances from the outer ends of the cylinders when the cranks are disposed at equal distances on opposite sides of dead center.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

GEORGE WASHINGTON SHOEMAKER.

Witnesses:
THOMAS WILSON,
ANNA M. BLACKMORE.