P. H. F. SPIES.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED DEC. 21, 1908.

1,003,535. **Patented Sept. 19, 1911.**

Fig. 1.

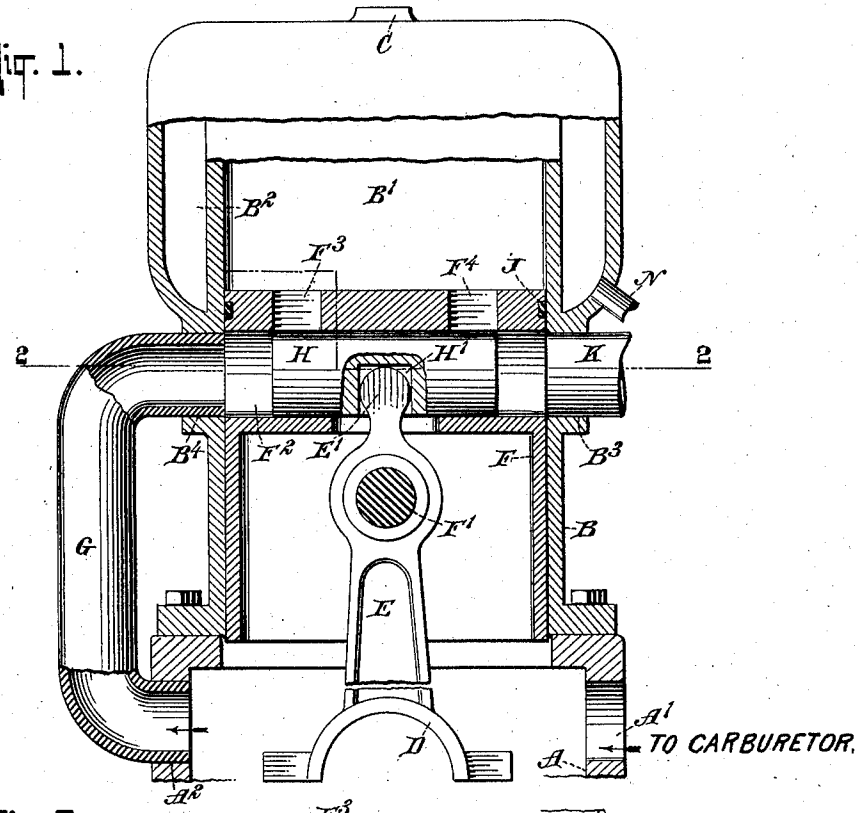
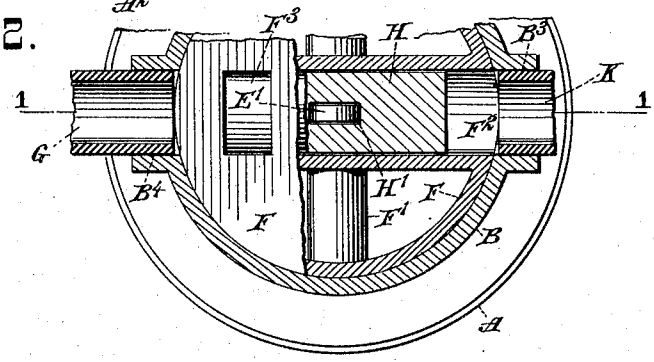


Fig. 2.



WITNESSES

G. V. Rasmussen

John A. Tetlenstock.

INVENTOR

Peter H. F. Spies

BY

Bonnesen & Knauth

ATTORNEYS

UNITED STATES PATENT OFFICE.

PETER H. F. SPIES, OF PORT CHESTER, NEW YORK, ASSIGNOR OF ONE-HALF TO JAMES F. KEENAN, OF PORT CHESTER, NEW YORK.

INTERNAL-COMBUSTION ENGINE.

1,003,535. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed December 21, 1908. Serial No. 468,461.

To all whom it may concern:

Be it known that I, PETER H. F. SPIES, a subject of the German Emperor, and a resident of Port Chester, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates to internal combustion engines and has for its object to simplify the construction and increase the efficiency of such engines and particularly to provide a construction which does not require any external valves with their usual valve gear. For this purpose I have devised an improved construction in which the piston of the engine contains a plunger operated by the connecting rod and performing the functions of the usual valves in connection with the piston itself, which is arranged to control ports in the walls of the cylinder.

A specific embodiment of my invention is illustrated in the accompanying drawings in which—

Figure 1 is a vertical section of a portion of my improved engine; and Fig. 2 is a horizontal section on line 2—2 of Fig. 1.

A designates the crank case, which according to the customary construction forms a closed chamber having a connection at A′ to receive a mixture of fluid and air from the carbureter. With this crank case is connected the cylinder B, the explosion chamber B′ of which may be cooled by a water jacket B^2. The spark plug will be located at C. The usual collar D is carried by the crank pin of the engine shaft and is connected with the rod E having a pivotal connection with a transverse pin F′ on the piston F. This piston, which Fig. 1 shows in its lowest position, is provided with a transverse chamber F^2, which may be cylindrical as shown and the ends of said chamber are adapted to register respectively with the exhaust port B^3 and with the admission port B^4 of the working chamber B′. The crank case A has an outlet A^2 from which a pipe G leads to the admission port B^4. The chamber F^2 is divided into two compartments by a plunger or valve H adapted to move therein transversely and one or the other of said compartments may communicate with the working chamber B′ by means of openings F^3, F^4 in the piston, according to the position of said plunger. In the dead center position shown in Fig. 1 the plunger H closes both openings or ports F^3 F^4. The position of the plunger or valve H is governed positively by the angular swing of the connecting rod E, said rod being provided with an extension E′ which engages a suitable recess H′ of the plunger H. One or more packing rings, such as J, may be provided on the piston F.

The operation is of the two-cycle type and proceeds as follows: Let us suppose that the piston rises from the position shown in Fig. 1, say by the manual turning of the engine wheel. This will produce a suction to draw a charge of the explosive mixture into the crank case A and will at the same time cause the plunger H to begin moving toward the right. The upward stroke is therefore a compression stroke so far as the working chamber is concerned. If there is any explosive mixture in the working chamber, as there is during the running of the engine, such mixture will be compressed and when the piston reaches the end of its up-stroke, ignition will take place in the well-known manner. At this time the valve H will have the same position relatively to the piston as in Fig. 1, but the piston will be raised to such an extent that its chamber F^2 does not register with either the port B^4 or the port B^3. As the piston descends during the explosion stroke, the plunger H will move first toward the left, thus uncovering the opening F^4, but no exhaust can take place until the right-hand end of the chamber F^2 comes into registry with the port B^3. The exhaust will then escape from the working chamber. During the second part of the downward stroke the plunger H will move toward the right, thus gradually closing the port F^4 as shown. During this downward movement of the piston a slight compression has occurred in the crank case and as the piston rises the plunger H will continue moving toward the right during the first half of the up-stroke, thus enabling the compressed mixture to pass through the pipe G and port B^4, the chamber F^2 and the port F^3 into the working chamber B′, as long as the port B^4 and the chamber F^2 are in registry. When the port B^4 has come out of registry with said chamber, the further upward movement will cause the final compression of the explosive mixture in the working chamber. It will be understood that the

points at which the motion of the plunger H changes from right to left or vice versa correspond to the half-way position of the piston F.

I claim as my invention:

1. In an explosive engine the combination with a cylinder having an admission port and an exhaust port, of a piston arranged to reciprocate in said cylinder and provided with a transverse chamber arranged to communicate with the admission and exhaust ports, said chamber having two ports by which it may communicate with the working chamber of the cylinder, a plunger linearly movable in said chamber and controlling said ports therein, a connecting rod, and means governed by the angular swing of the connecting rod for moving said plunger within the chamber of the piston.

2. In an internal combustion engine, the combination of a cylinder having an inlet and an outlet, a piston arranged to reciprocate therein and provided with a transverse chamber arranged to communicate with the working chamber of the engine and with the said inlet and outlet, a crank shaft, a rod connected with said crank shaft and with said piston, a plunger in said chamber controlling its communication with said working chamber and means for moving said plunger linearly by the angular swing of the connecting rod.

3. In an internal combustion engine, the combination of a cylinder having inlet and outlet ports, a piston arranged to reciprocate in said cylinder and provided with a chamber communicating with the working chamber of the engine and with said inlet and outlet ports, a crank shaft, a rod connected with said crank shaft and said piston, a plunger movable within the piston chamber and controlling its communication with the working chamber and means for moving said plunger linearly by the angular swing of the connecting rod.

4. In an explosive engine the combination of a cylinder having inlet and outlet ports, a piston provided with a chamber arranged to communicate with the working chamber of the cylinder and with the said ports, a plunger movable within said chamber and controlling its communication with the working chamber of the cylinder, a connecting rod pivotally connected with the piston and means for moving the plunger linearly by the angular swing of the connecting rod.

5. In an internal combustion engine the combination with a cylinder having ports for the admission and exhaust of the explosive mixture, a crank case communicating with said cylinder and having an outlet communicating with the said admission port and also an inlet for the explosive mixture, a piston movable in said cylinder and controlling the ports thereof, said piston having a chamber adapted to register with said ports and arranged to communicate with the working chamber of the cylinder, a controlling member carried by the piston and movable relatively thereto to govern the communication of said piston chamber with the working chamber, a connecting rod pivoted to the piston and means for moving said controlling member linearly by the angular swing of the connecting rod.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PETER H. F. SPIES.

Witnesses:
JOHN LOTKA,
JOHN A. KEHLENBECK.