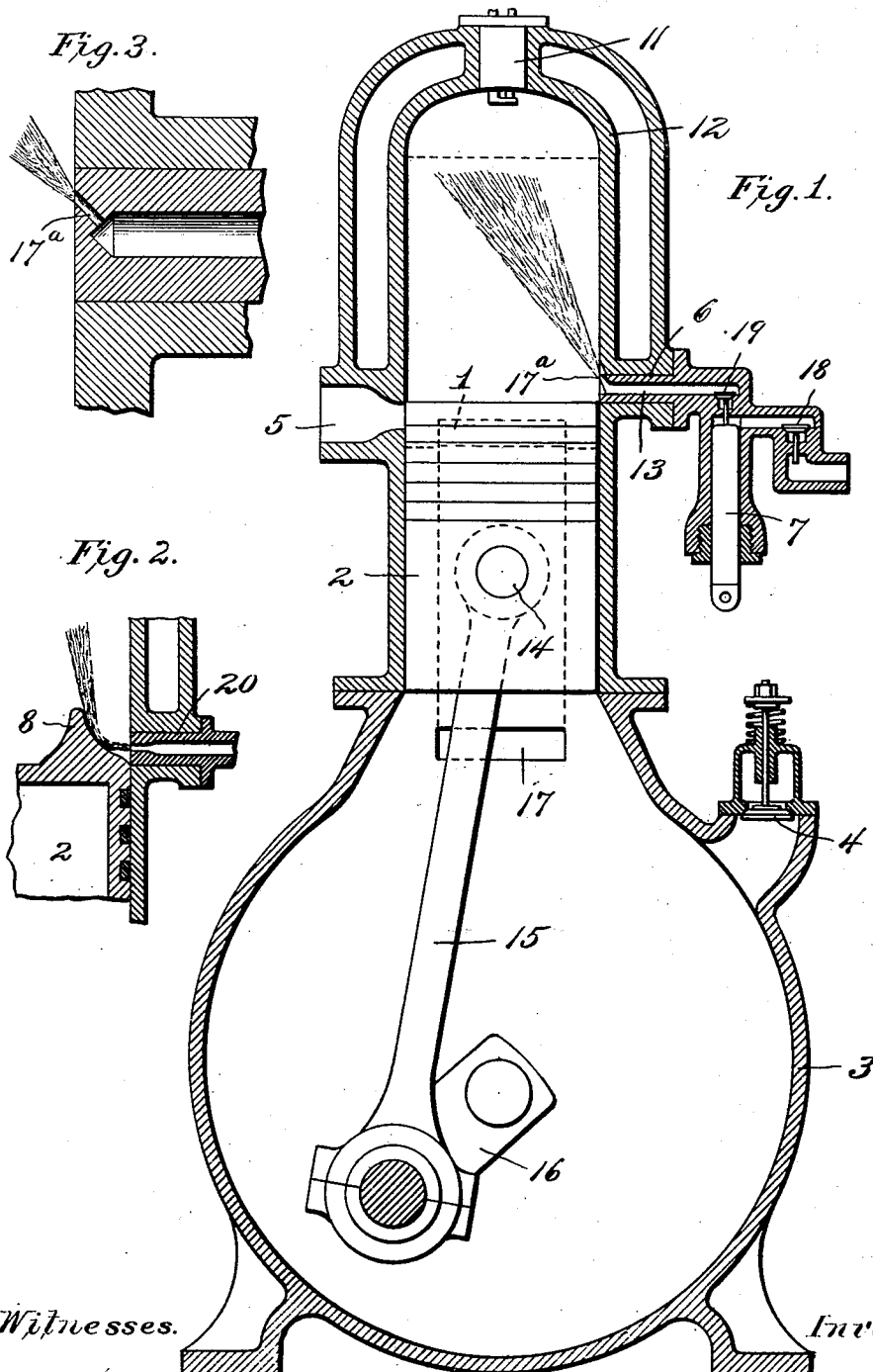


H. SÖHNLEIN.
EXPLOSION ENGINE.
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Patented Jan. 11, 1910.



Witnesses.

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HEINRICH SÖHNLEIN, OF WIESBADEN, GERMANY.

EXPLOSION-ENGINE.

946,406.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HEINRICH SÖHNLEIN, a subject of the German Emperor, residing at Wiesbaden, Germany, have invented certain new and useful Improvements in Explosion-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 explosion engines and more particularly to two-stroke cycle engines, whose inlet and outlet ports are controlled by the piston.

It has been customary to introduce a charge through the inlet port while the outlet or exhaust port is wide open. This structure is very liable to cause losses of fuel.

My present invention has for its object a novel construction of explosion engines, preferably two-stroke cycle engines, in which these defects are avoided.

Referring to the drawings, in which like parts are similarly designated—Figure 1 is a vertical section of a two-stroke cycle engine. Fig. 2 is a detail of a modification showing a liquid fuel feed. Fig. 3 is a section showing the fuel feed of Fig. 1 on an enlarged scale.

The engine cylinder 12 is provided at its top with a suitable igniter, preferably an electric igniter 11, has an inlet 13 for fuel and an exhaust port 5, as well as an inlet port 1 for air, all controlled by the piston 2, that is connected by pin 14 and connecting rod 15 to the crank 16, inclosed in a casing 3 having an inlet valve 4. The interior of said casing is connected by duct 17 with the inlet port 1 and acts as a pump chamber.

In Fig. 1 the piston is shown on its return stroke having just closed the outlet port 5 and just beyond the end of the piston when in this position is a fuel injecting nozzle 6 of the fuel pump 7.

The small orifice 17^a in the injecting nozzle is so arranged and directed that the stream of liquid or other fuel will pass substantially longitudinally through the cylinder.

The fuel pump 7 may be actuated by any suitable mechanism such as a cam motion, not shown, but the motion must be so regu-

lated that the liquid will be forced into the cylinder quickly and at the proper time. The pump may either discharge pure liquid fuel or liquid and air mixed and may also be designed to discharge gaseous fuel, in which case its capacity must be such as to suit the volume of gas to be delivered.

18 and 19 are check valves to permit the proper operation of the pump. The same result can be obtained by means of a deflector 8, Fig. 2, against which a stream of liquid will be forced by injecting nozzle 20.

The engine may be provided with several pumps of the type herein described that may serve to inject fuel or water if desired, or two or more pumps may operate simultaneously or alternately to feed different kinds of fuel.

The operation is as follows: In the position shown in Fig. 1, the upper part of the cylinder is filled with air and the piston has just closed the exhaust port 5. At this moment plunger 7 of the fuel pump is rapidly forced in and a thin stream of liquid fuel is injected into the cylinder. The fuel is finely sprayed and the center line of the spray is directed toward the center of the explosion chamber and mixes with the air in the cylinder. The piston now travels upward, covers the injecting nozzle of the pump and compresses the charge; this is ignited by the sparking plug 11 and the piston is forced down when near the lower dead center, the exhaust port 5 is uncovered, the hot gases escape and the pressure falls to atmospheric pressure, the piston then uncovers the air inlet port 1 and the air from the pump chamber (crank casing 3) passes through duct 17 into the cylinder. The piston now returns, closing ports 1 and 5 in succession when a fresh supply of fuel is forced into the cylinder. During the up-stroke the piston draws air through valve 4 into the crank casing, which air on the down-stroke is slightly compressed to enable it to rapidly fill the cylinder.

Such a structure has the following advantages: 1. Direct losses of fuel are absolutely prevented as the cylinder is entirely closed when the fuel is injected. 2. The fuel has a long path to traverse and but little comes in contact with the cylinder walls, hence is sprayed thoroughly into and intimately mixed with the air in the cylinder. 3. The injecting nozzle is not exposed to any excessive heat or pressure, consequently the

discharge nozzle does not plug or corrode and the liquid fuel cannot be boiled in the nozzle. 4. The pump works with comparatively low pressure, as the compression within the cylinder has scarcely begun when the injection of fuel takes place. 5. The fuel does not at all or but slightly come in contact with the walls of the cylinder and in the most unfavorable case only with the rough cast iron surfaces of the cylinder head, no rust can form on the engaging surfaces, no fuel will become mixed with oil and thus have its efficiency destroyed, and the oil will not be rendered unfit for lubrication.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent, is:—

1. An explosion engine comprising a cylinder having an air port, an exhaust port, a power piston to control said ports, a fuel forcing pump to force fuel into the cylinder at the beginning of the return stroke of the piston just after said piston has closed the

exhaust port, and a fuel injecting nozzle connected to said fuel forcing pump, entering the power cylinder in a plane quite close above the top of said exhaust port and having its discharging opening directed approximately longitudinally to the axis of the cylinder toward the center of the combustion chamber substantially as and for the purposes set forth.

2. An explosion engine comprising a cylinder having an air inlet port, an exhaust port, a fuel injecting nozzle entering the cylinder, whose delivery end is directed upward and inclined to the axis of the cylinder and a piston controlling said ports.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

HEINRICH SÖHNLEIN.

Witnesses:

JEAN GRUND,
CARL GRUND.