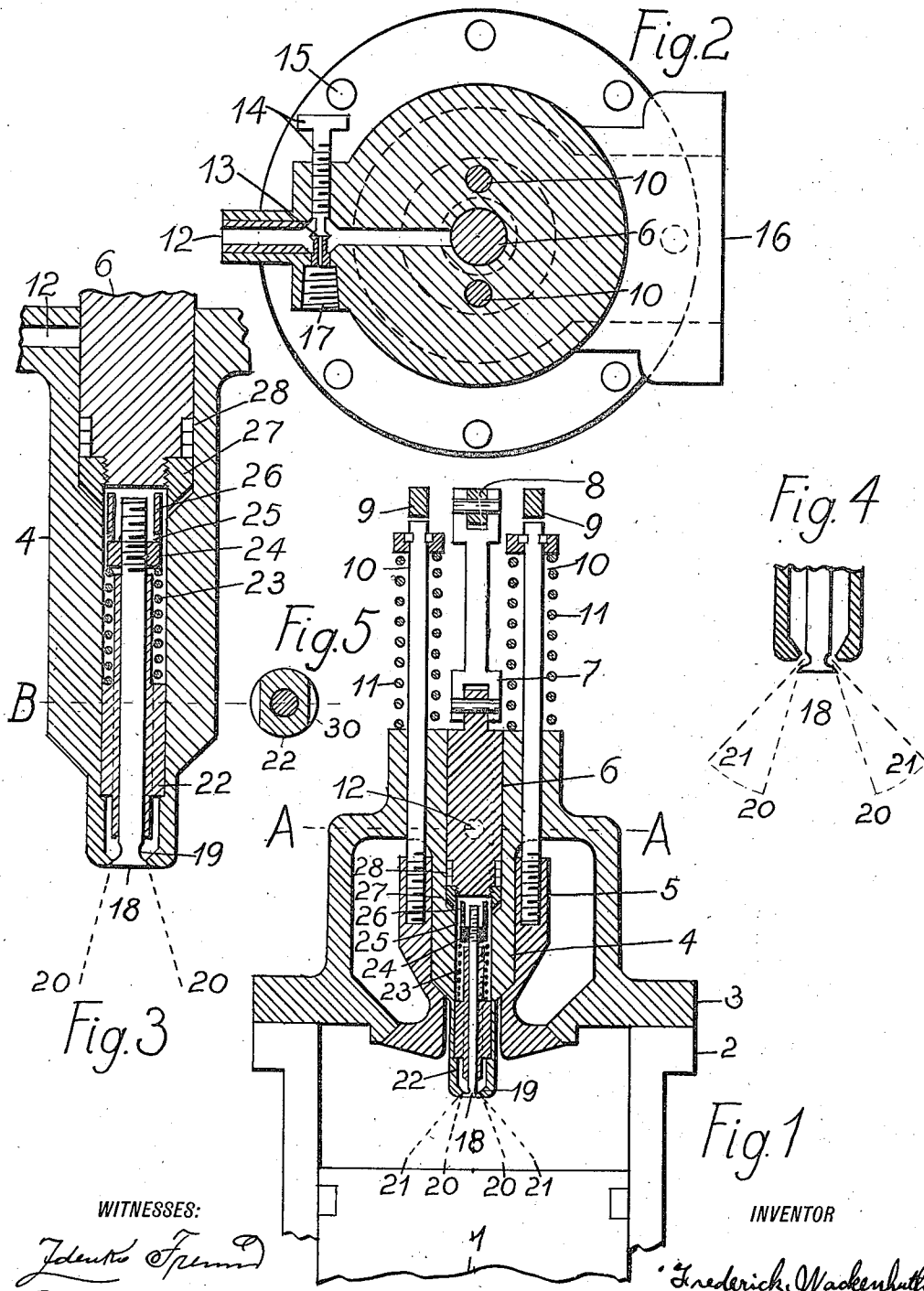


F. WACKENHUTH.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED AUG. 15, 1913.

1,201,533.

Patented Oct. 17, 1916.



WITNESSES:

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FREDERICK WACKENHUTH, OF NEWARK, NEW JERSEY.

INTERNAL-COMBUSTION ENGINE.

1,201,533.

Specification of Letters Patent.

Patented Oct. 17, 1916.

Application filed August 15, 1913. Serial No. 784,983.

To all whom it may concern:

Be it known that I, FREDERICK WACKENHUTH, a citizen of the United States of America, residing at 97 Lafayette street, city of Newark, county of Essex, and State of New Jersey, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates to an improved cylinder-head construction for internal combustion engines, in connection with an improved exhaust valve, improved fuel injection pump system, and cylinder injection fuel nozzle.

Reference is had to the accompanying drawing, in which similar figures refer to similar parts through the several views, in which Figure 1 is a vertical section of an engine cylinder-head showing details of exhaust valve, pump, and nozzle; Fig. 2 is a cross-section of A A Fig. 1; Fig. 3 is an enlarged section of nozzle piece; Fig. 4 is an enlarged view of nozzle showing direction of spray by dotted lines; Fig. 5 is an enlarged cross-section of nozzle at line P, Fig. 4.

Referring to Fig. 1, 1 is the piston of a gas engine, 2 cylinder, 3 an improved cylinder head having a central projection 4 for guide of the exhaust valve 5; 6 pump plunger operated by link and lever 7, 8; 9 levers for operating exhaust valve rods 10; 11 are springs for closing exhaust valve 5; 12 liquid fuel and air mixture supply port or hole, which is uncovered by pump plunger 6 on end of up or suction stroke; 13 shown in Fig. 2 is a liquid fuel nozzle located in passage 12. This section, Fig. 2 is taken on line A A Fig. 1. 14 valve for regulating the liquid fuel outlet from nozzle 13. 15 cylinder head cap screw holes. 16 outline of exhaust outlet port. 17 threaded connection for liquid fuel supply to nozzle 13.

18 is the fuel spraying valve, shown enlarged in Fig. 3.

19 is a curved portion next to valve seat for producing an expansion spray, as shown by the dotted lines 20 which is the direction of spray on start, and dotted lines 21, Fig. 4, showing valve 18 fully opened and the direction of spray having passed from direction of dotted lines 20 to 21. This action is produced by the curved portion 19 next to valve seat, as shown.

22—Fig. 3—is a guide for valve rod 18; 23 spring for closing valve 18; 24 nut on

end of valve having holes 25 in tubular extension 26 of nut; 27 retaining piece for plunger piston rings 28.

Referring to Fig. 5, which is a cross-section of Fig. 3 on line "B", 30 is the form of passage for the air-oil mixture to valve nozzle 18.

Having described the various parts of my invention, I will now describe the operation of same.

The exhaust valve 5 is opened by a cam on end of expansion stroke of piston, as is the well known practice, and is guided to its seat by the central extension of cylinder head. This central guide is of importance, as valves heretofore constructed on this order have not provided a suitable guide for valve, the valves generally not seating properly on account of a defective guide support for closing valve to its seat. This central guide portion 4 also contains the fuel injection system, which is operated as follows: On the suction stroke of the plunger 6 it uncovers fuel supply hole 12, in which is located the liquid fuel nozzle 13 and thereby drawing a liquid fuel air mixture into pump cylinder. This pump plunger 6 makes its injection stroke at a point in movement of engine piston which is most suitable for the injection to take place, in order to prevent a tendency of gravitation, for the liquid fuel to pass first to nozzle 18; the tubular extension 26 and holes 25 are provided for the end of nozzle valve rod, the air which would have a tendency to force the liquid fuel first into cylinder, is in this case passed through holes 25 and thereby mixing with the liquid fuel as it passes to valve nozzle 18. The injection nozzle 18 is opened by the pressure in pump cylinder and the opening is regulated by the nut on end of rod striking the end of valve rod guide, the valve 18 is closed by the spring 23 having a predetermined pressure.

The object of drawing a liquid fuel air mixture into a pump cylinder is that the liquid fuel can be injected with more accuracy and in a finer state of division than if only liquid fuel was injected direct into cylinder.

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

1. In an internal combustion engine, an improved fuel injecting nozzle, consisting

of the combination of a spring pressure, seated poppet check valve, said valve rod having a nut with a tubular extension on its valve rod end, and the said extension having
5 port holes therein, and the said valve rod having a curved surface adjacent to the poppet valve seat, a guide for valve rod having fuel passage therein, and on its upper
10 end there being the fuel valve closing spring, the said spring maintaining a fixed pressure of the fuel spray valve to its seat, for the purpose described.

2. In an internal combustion engine the fuel injecting combination, consisting of a
15 fuel pump cylinder having a fuel outlet to a nozzle located in combustion chamber of engine; a pump plunger operating in said cylinder, said pump plunger uncovering near end of up or suction stroke, an air supply tube, in passage of which is located a
20 liquid fuel nozzle; means for operating the pump plunger so as to cause the fuel, air mixture, to be injected into combustion

chamber of engine at the desired point of piston movement, as described. 25

3. In an internal combustion engine, an improved cylinder head construction, consisting in combination of a cylinder head with a central concentric projection for
30 guide of exhaust valve and seat, the said central guide having a pump cylinder therein and a pump plunger operating in said cylinder, the said plunger uncovering near end of its up-stroke a fuel and air mixture supply port, and the said central guide ex- 35 tension of cylinder head having a spray nozzle therein, for the purpose described.

In testimony whereof, I, FREDERICK WACKENHUTH, have signed my name to this specification in the presence of two subscri- 40 ing witnesses, this thirteenth day of August, 1913.

FREDERICK WACKENHUTH.

Witnesses:

IDENKO FREUND,
RICHARD F. FAUX.