P. D. JOHNSTON.

DEVICE FOR SUPPLYING OIL TO INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JULY 7, 1906.

997,136. Patented July 4, 1911.

Fig. 1

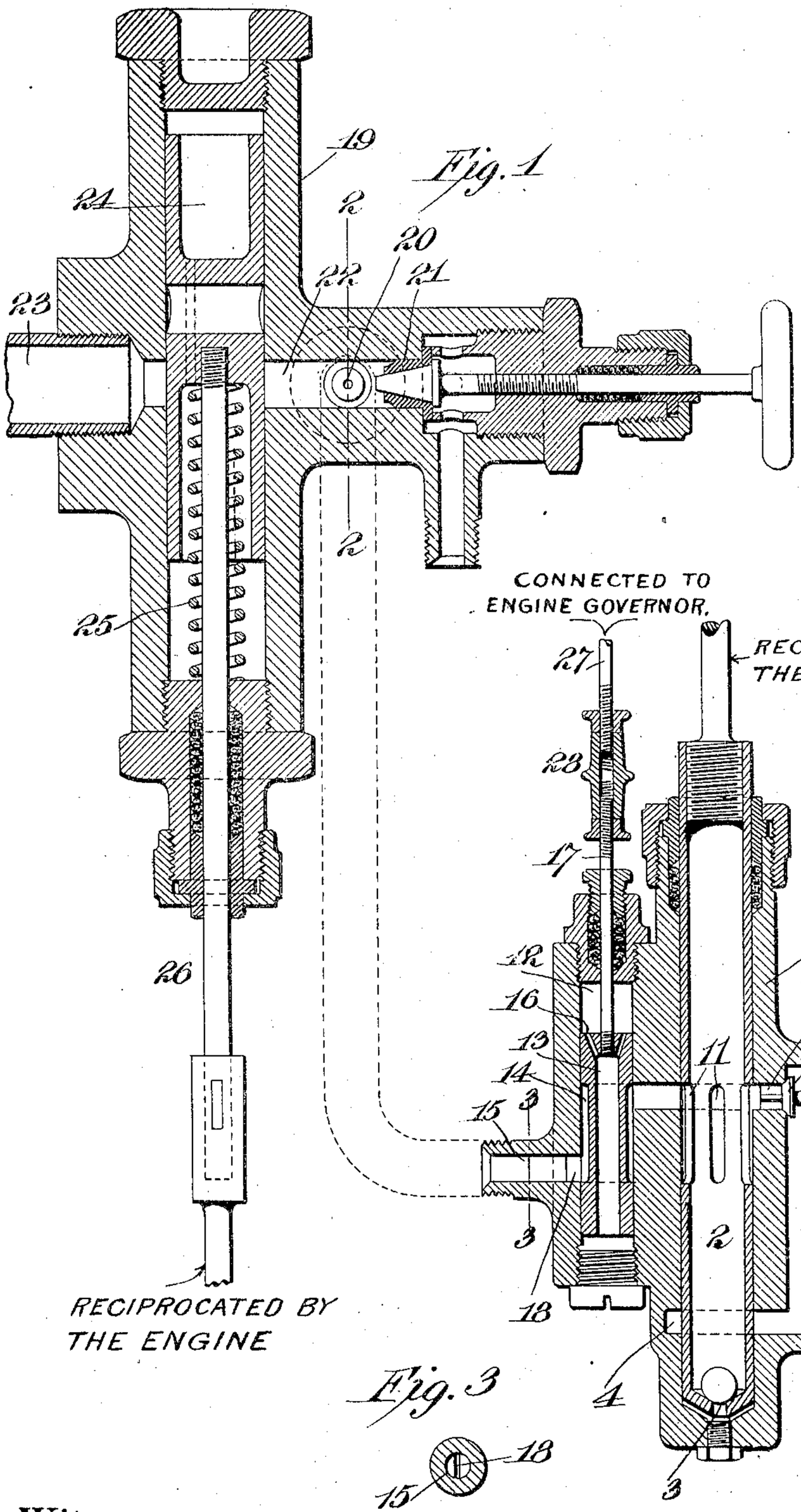

Fig. 2

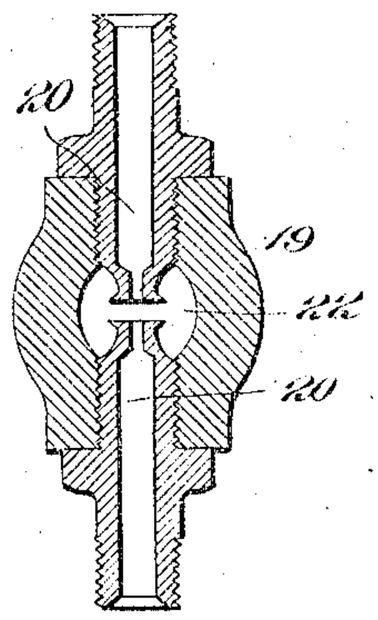

Fig. 3

Witnesses:

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PHILIP DEVEREUX JOHNSTON, OF COLD SPRING, NEW YORK, ASSIGNOR TO AMERICAN OIL ENGINE COMPANY, A CORPORATION OF NEW YORK.

DEVICE FOR SUPPLYING OIL TO INTERNAL-COMBUSTION ENGINES.

997,136. Specification of Letters Patent. **Patented July 4, 1911.**

Application filed July 7, 1906. Serial No. 325,113.

To all whom it may concern:

Be it known that I, PHILIP DEVEREUX JOHNSTON, a citizen of the United States, residing at Cold Spring, in the county of Putnam and State of New York, have invented a certain new and useful Improvement in Devices for Supplying Oil to Internal-Combustion Engines, of which the following is a description.

The object I have in view is the production of a device for use in connection with internal combustion engines, particularly of the type which employs the denser hydrocarbons which are vaporized or atomized with water or air under pressure.

By the present invention I seek to govern the quantities of oil or water introduced into the engine by positive means actuated directly at the pump.

Further objects of the invention are to produce means for permitting this to be done, such means being simple, possessing few parts, and which are sure and certain in their operation.

These and further objects will appear from the following specification and accompanying drawings.

I attain these objects by the mechanism illustrated in the accompanying drawings, which show one embodiment of the invention, and in which—

Figure 1 is a section of the pump, the governing valve, and the mixing valve; Fig. 2 is a section on the line 2—2 of Fig. 1; and Fig. 3 is a section on the line 3—3 of Fig. 1 looking toward the pump.

In all the views like parts are designated by the same reference characters.

In carrying out my invention I provide a pump which is actuated by a cam or other means operated from the engine so as to give an impulse to inject the liquid into the mixing chamber at the proper period of the cycle of operation of the engine. This pump works with an invariable stroke, and a valve is provided to regulate the amount of liquid injected by the pumps, a loaded valve being connected to a by-pass to permit the escape of the surplus. In connection with this pump is a mixing valve, by means of which oil and water, each introduced through separate nozzles from separate pumps, will be vaporized and mixed in connection with a stream of air introduced under pressure into the same mixing chamber. The complete mixture will pass into the combustion chamber through a cutoff valve, which will be operated at the proper time to prevent back pressure from forcing the products of combustion into the mixing chamber.

In the drawings the reference character 1 represents the casing for the pump, in which a hollow piston 2 is reciprocated. A packing and gland are provided to prevent leakage around the top of the piston. The end of the piston is provided with a port, which is closed by a ball valve 3. Communicating with the central opening of the casing 1 is an annular port 4 which communicates with a by-pass 5. Liquid is supplied to the pump through the port 29, which communicates with the annular port 4. Above this annular port 4 is a second annular port 6, which is closed by a spring-loaded valve 7, the stem of this valve resting within an opening in a screw-plug 8 which is inserted in the gland or bonnet 9, the spring 10 being compressed between the head of the valve and the plug 8. The plug may be adjusted in position to vary the tension on the spring 10 to adjust the amount of overload required to open the by-pass valve.

The piston 2 is provided adjacent to the port 6 with a number of ports 11. The other extremity of the port 6 communicates with a valve chamber 12, within which works a slide valve 13. This slide valve 13 is provided with an annular port 14 intermediate its ends, which communicates with the port 6 and also with an exhaust port 15. The valve 13 is hollow and is provided with equalizing ports 16 in its head. It is operated by means of a spindle 17 which passes through a packing and gland at the top of the valve chamber 12. The ports 16 permit equalization of pressure inside and outside of the valve, so that it may be readily moved within the chamber. The ports 16, permitting the valve to be balanced, allow

it to be moved with very little force necessary to be exerted upon it. This is of importance in connection with automatic governing mechanism, the power available to be exerted by the governor being limited, and it being desirable that the valve be capable of being moved with the smallest possible amount of energy.

The size of the annular port 14 is such, and its location is so arranged in relation to the port 6, that it will always be in communication with the same. It is so arranged, however, in relation to the port 15 that by being moved upward from the position shown in the drawing, it may more or less completely close such port. The port 15 is reduced in cross-section at 18 adjacent to the valve 13 so as to provide a narrow vertical opening, which constitutes a port of little width in proportion to height. By the configuration of this port a uniform movement of the valve will produce a substantially uniform opening or closing of the passage, which would not be the case if the size of the port were not so reduced as to produce a vertical port, as shown. The port need not necessarily be rectangular as the same results may be secured by means of a port which is not exactly a true rectangle in shape. A screw-plug closes the lower extremity of the valve chamber 12 and permits the removal of the valve, and a removable plug also closes the bottom of the pump chamber 1 to permit removal of sediment and other foreign matters.

In connection with the pump thus described is used a mixing valve, it being understood that two pumps are used in connection with each mixing valve. The connecting pipe between the valve and the pump is shown in dotted lines. The mixing device comprises a body 19 having nozzles 20 screwed therein, one of each such nozzles being for oil and the other for water, and each being connected to a pump, as described. The orifices of the nozzles are opposite one another, as shown in Fig. 2, so that the jets of oil and water will strike against each other and the oil will be completely atomized and mixed with the finely divided water. An air nozzle 21 at right angles to the other two nozzles is provided, through which air under pressure is admitted into the mixing chamber 22. This nozzle 21 is shown as closed by a hand valve, by means of which the extent of opening may be regulated.

The mixing chamber communicates with the retort 23 through a cutoff valve 24. This cutoff valve is shown to be a slide valve having a central port which permits communication between the mixing chamber and the retort. This valve is elevated by a spring 25, as shown, and depressed by the stem or rod 26, the latter passing out through a packing, as shown, and being connected to an element on the engine to move it at the proper time during the cycle of operation of the engine.

The controlling valve 13 is connected to the governor through the agency of the rod 27. A turnbuckle 28 is interposed between the rod 27 and the valve stem 17 so as to vary the length of the rod and by means of which the position of the valve may be altered in relation to the governing mechanism. By providing one of these turnbuckles for each valve, the proportions of oil and water admitted into the mixing chamber may be varied as desired.

In operation, the pump 2 steadily forces the liquid (oil or water) into the port 6. A certain proportion of this liquid passes out through the port 15 into the mixing chamber, the proportion varying according to the position of the valve 13. The surplus liquid passes through the by-pass valve 7 into the by-pass 5 and into the annular port 4, where it will be pumped back into the hollow piston of the pump. The tension on the spring 10 is adjusted to cause the pump to properly force the liquid into the mixing nozzles.

Having now described my invention, what I claim as new is:

1. In an internal combustion engine, the improved controlling means for delivering the fuel, which comprise a pump, a controlling valve therefor, the said valve being a slide valve, and an exit port for the valve, the said port being restricted at the end adjacent to the valve so as to provide a longitudinal passage.

2. In an internal combustion engine, the improved means for controlling the admission of fuel thereto, which comprise a mixing device and a pump, a controlling valve between the pump and the mixing device, operating means for the valve, and means for varying the position of the valve in relation to the operating means.

3. In an internal combustion engine the improved means for controlling the admission of fuel thereto, which comprises a mixing device and a pump, a controlling valve between the pump and the mixing device, and means for operating said valve from the engine comprising a connection having a turn-buckle therein by means of which the position of the valve may be adjusted.

4. In combination with an internal combustion engine, a pump for supplying fuel thereto, comprising a cylinder, a hollow piston reciprocating therein, a valve in the bottom of said piston, intake and outlet ports in said cylinder, a by-pass connecting

said ports, a loaded valve in said by-pass permitting passage of liquid only from the outlet port to the inlet port, ports in said piston registering with said outlet port at all positions of said piston, and a valve controlled by the engine governor for controlling the effective opening of said outlet port.

This specification signed and witnessed this 3rd day of July, 1906.

PHILIP DEVEREUX JOHNSTON.

Witnesses:
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