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2,096,581

FUEL INJECTION VALVE

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Fig. 1.

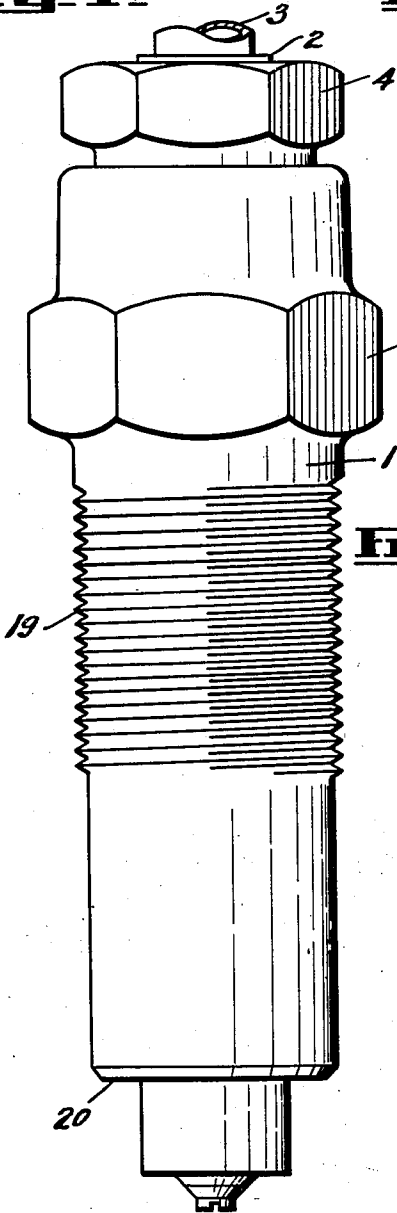


Fig. 2.

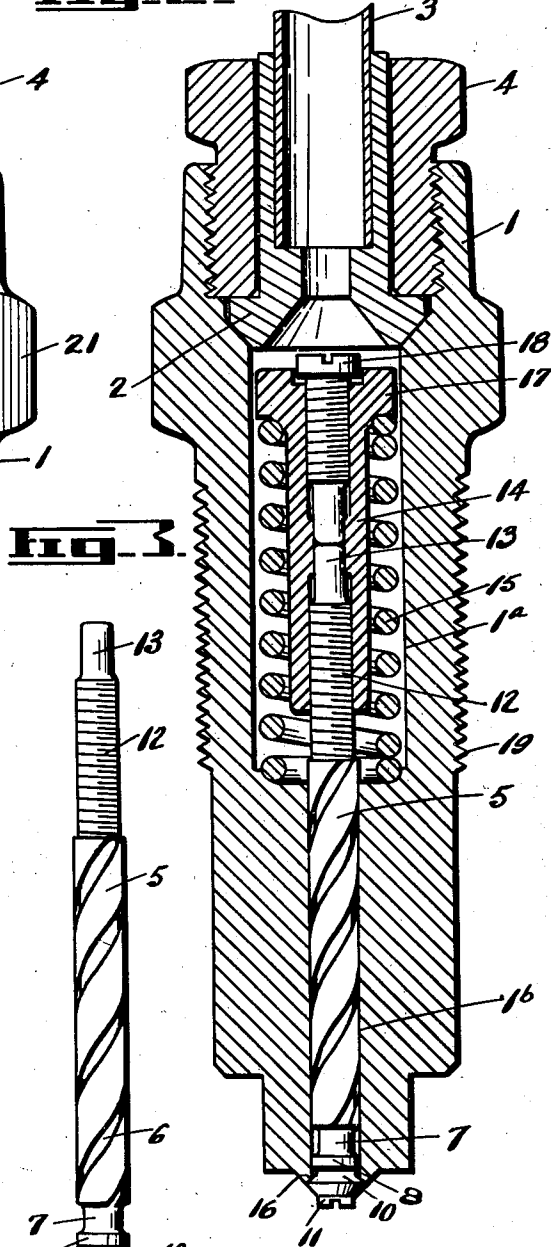


Fig. 3.



Fig. 4.



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FUEL INJECTION VALVE

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1 Claim. (Cl. 299—107.6)

This invention relates to fuel injection valves for internal combustion engines and particularly to injection valves for controlling the injection of a spray of fuel oil into the combustion space of Diesel type engines. The objects of invention are, to produce an injection valve that will be simple in construction, not liable to disorder, positive in operation and that will give a uniform spray of fuel oil under greatly varying requirements of the engine. These objects, as well as others not here enumerated, will be apparent from the following description taken in connection with the drawing, in which:—

Fig. 1 is an elevation view of the invention.

Fig. 2 is a sectional view of Fig. 1.

Fig. 3 is a view of the fuel injection control valve removed from the body.

Fig. 4 is a transverse sectional view of the fuel injection valve of Figure 3.

Throughout the several views of the drawing, similar characters refer to similar parts, and:

1 is the fuel injection valve body; 2 fuel conductor tube union connecting thimble; 3 fuel conductor tube; 4 union connector nut; 5 fuel injection valve consisting of a stem having spiral grooves 6 on its periphery; reduced diameter neck 7, fuel distributing collar 8, conical fuel shut off portion 10, slotted head 11, threaded shank portion 12 and reduced diameter portion 13, threaded into the spring tension collar 14, spring 15 pressed to bring the shut-off portion 10 against seat 16 of the body. The collar 14 is provided with an enlarged end 17 for guiding the movement of the fuel injection valve which also provides a seat for the valve tension spring 15. The tap screw 18 provides means whereby the threaded portion 12 of the fuel injection valve may be locked against longitudinal displacement when adjusted to the required tension of the spring 15 to the amount of fluid fuel delivered from the nozzle past the shut-off portion 10 of the valve. That the fuel injection valve may be secured to the engine, threaded portion 19 on the body is provided. The shoulder 20 contacting a shoulder of the threaded hole in the engine casting, "not shown", prevents screwing the body beyond its desired position. 21 is a hexagonal nut-like portion for the application of a wrench whereby the body may be turned and securely screwed into the engine's casting.

In operation, after the fuel injection valve has been installed by screwing it into the cylinder block or cylinder cover of the engine with its nozzle end registering with the combustion space within the engine and connected to the fluid fuel pump driven by the engine in timed relation to the engine's piston movement, the fluid fuel is pumped and delivered to the injection valve in impulses caused by the plunger stroke of the fluid

fuel pump. Each impulse of the fluid fuel forces the valve 10 away from its seat 16, permitting the fluid fuel to escape in a spray through the opening so made around the periphery of the valve 10. Due to the very slight clearance necessary between the stem 5, which clearance is made less than .0002 of an inch, to properly guide the valve 10 and maintain a like clearance all around it, are provided spiral fuel conductor grooves 6. The purpose of having the spiral grooves around the valve stem 5 is that a complete cylindrical surface is thereby presented to the bore of the body 1; whereas, if the grooves were parallel with the axis of the stem, grooves would be worn in the wall of the bore and the valve 10 would not be guided centrally with its seat 16, and the jet or spray of fluid fuel would not be of uniform density at all sides of the valve. The grooves 6 each provide a solid unchoked delivery stream of the fluid fuel to the neck 7 where the fuel is met and checked by the fuel distributing collar 8, the clearance of which between the collar and the wall of the bore 1b is the same or slightly greater than that of the shank 5 and such that the flow of fluid fuel will be checked and evenly distributed as it reaches the valve 10 and a jet or spray of uniform density will be delivered to the engine's combustion space which is necessary to obtain smokeless combustion, which is substantially perfect combustion. The uniform density of the spray throughout is not only desirable when the engine is operating at full load, but is exceedingly important under varying loads and speed. The fluid fuel forced through the spiral grooves of the valve stem 5 rapidly meets with the distributing collar 8, which checks its flow and distributes it evenly throughout its circumference and against the valve 10 and thereby a spray of uniform density is caused to be delivered into the combustion space of the engine and substantially perfect combustion and smokeless exhaust and the maximum of power are obtained.

The invention having been duly described, what I claim is:—

In a fuel injection valve for internal combustion engines including a body having a smooth bore of two or more diameters, extending axially therethrough; a stem having an enlarged portion slidable in said bore and having a fuel control valve at one of its ends in spaced relation to said enlarged portion and joined thereto by a neck of lesser cross-sectional area than the said enlarged portion and the fuel control valve and a fuel distributing collar intermediate and in spaced relation to the fuel control valve and the enlarged portion of the said stem, and a threaded shank at the end of the stem farthest removed from the said fuel control valve.

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