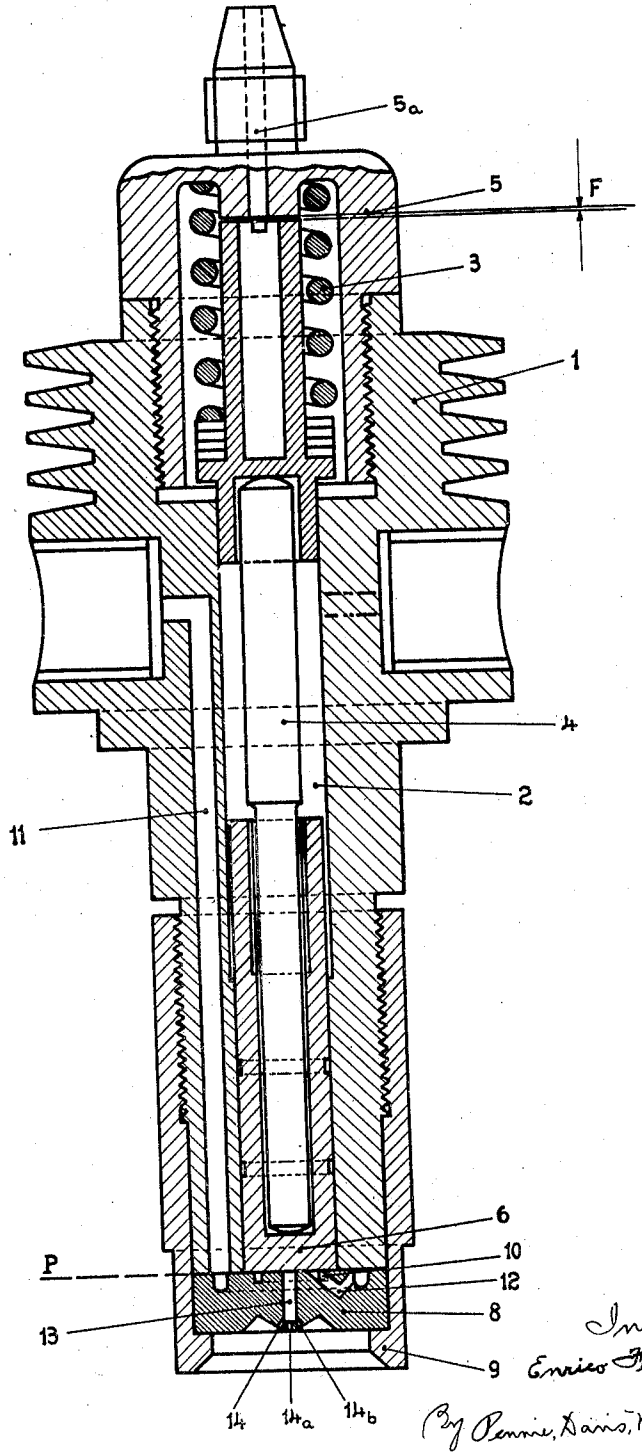
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LIQUID FUEL ATOMIZER FOR INTERNAL COMBUSTION ENGINES

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LIQUID FUEL ATOMIZER FOR INTERNAL COMBUSTION ENGINES

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4 Claims. (Cl. 299—107.6)

This invention relates to a liquid fuel atomizing or spraying arrangement for internal combustion engines with airless injection. The atomizers of this kind consist essentially of small valves with a conical seat arranged so as to open into the fuel in-flow chamber and are operated by the hydraulic pressure of a piston pump supplying and measuring the fuel. The useful valve lifting pressure is applied in such constructions on the annular surface of the step formed by the difference in diameter between the conduit receiving the conical valve part and the guided valve stem. The valve is kept on its seat by a return spring. The fuel is injected into the engine cylinder under the pressure exerted by the pump against the action of the return spring.

These apparently simple devices are unreliable in operation and difficult to construct with a view to obtain a tight seal between the valve stem and the guide thereof and to insure at the same time a perfect centering between the conical seat and the cylindrical guide surface. As it is impossible to fully eliminate leakage in the clearance between the valve stem and guide, this leakage may be so important as to affect the operation of the pressure responding means or so small as to affect the lubricating and cooling effects which said leakage actually should take care of. Leakage may be different in the various injectors of the same engine unit and thus objectionably affect the engine operation.

This invention relates to an atomizing and injecting device in which the closure of the conduits is effected by a valve having a flat seat, which fully intercepts also the communication between the pressure chamber to which the fuel is supplied by the pump and the guide in which the valve stem slides. As the valve lift is limited to a few tenths of a millimeter, by my arrangement the pressure fluid escaping during operation through the inevitable clearance about the guided valve stem constantly undergoes a considerable fall in pressure owing to the drawing action to which it is subjected between the cooperating intercepting surfaces.

My invention enables the leakage to be advantageously kept within determined limits to insure a steady working of the arrangement with a simple construction, though allowing of a certain range in the accuracy of fit between the valve stem and guide. My construction gives an improved tight closure over the known arrangements with a conical seat owing to the easier machining of a flat seat and because the accurate centering of the valve guide with respect to the seat is no longer necessary. With my arrangement the spring load is not totally imposed upon the tight-sealing surfaces of the injector, for it is distributed also upon the cooperating planes intercepting the communication between the pressure chamber and stem guide. This arrangement reduces the shocks between the planes thus improving the life of the machined tight-sealing surfaces over previous constructions.

The accompanying drawing shows by way of example a construction according to my invention.

The body 1 is fitted on to the engine cylinder. The pressure spring 3, valve stem 4 and spring adjusting screw 5 are arranged in the chamber 2. The screw 5 is provided with a bore 5*a* receiving the conduit collecting fuel leakage from the valve.

The flat-seat valve 6 is fitted on an extension 8 of the chamber 2. The extension 8 clamped on the body 1 by means of the nut 9 forms the seats cooperating with the working surfaces of the valve 6 and adjacent to the outer surfaces of the body 1, all said surfaces and seats lying in the same plane P.

An annular groove 10 forming the pressure chamber is bored in the extension 8 and is connected through the conduit 12 with the conduit 11 for the inlet of the liquid supplied by the injection pump. The annular chamber can also be recessed wholly or in part in the valve stem.

A further conduit 13 is provided in the extension 8 and leads to the nozzles 14, 14*a* and 14*b* opening into the engine cylinder.

The annular pressure chamber 10 is located concentrically to the guide for the valve stem and to the valve working surfaces. In the operation of the device, the liquid filling the conduits transmits the pressure exerted by the pump piston to the valve body 6. The useful pressure for lifting the valve is applied to the plane normal to the axis of the annular chamber 10.

The working valve surfaces are withdrawn from the seat formed by the extension 8 against the action of the spring by the extent of the valve lift F. The liquid drawn under pressure between the cooperating valve surfaces thus removed from each other flows divided into a number of droplets over the conduit 13 through the nozzles 14, 14*a* and 14*b*.

Leakage about the valve guide 2 is reduced owing to the fall in pressure due to the intercepting surfaces in the plane P.

What I claim is:

1. A valve for the airless injection of fuel into the cylinders of internal combustion engines comprising a body with a conduit for the supply of fuel under pressure, a recess, a fuel delivery conduit and a seat surrounded by the inner wall of said recess and into which open said fuel supply conduit and fuel delivery conduit, a valve stem guided in said recess in said body and subjected to the pressure of the fuel in said supply conduit, a spring acting on said valve stem, said valve stem having two flat working surfaces, cooperating with said seat and of which one cuts off the communication between said fuel supply conduit and said fuel delivery conduit, and the other cuts off the connection between said fuel supply conduit and the inner wall of said recess guiding said valve stem.

2. A valve as claimed in claim 1, in which the said two working surfaces of the valve stem are situated in one plane and the surfaces of said seat between the inner wall of the recess and the opening of the fuel supply conduit as well as between the latter opening and the opening of the fuel delivery conduit are situated in one plane.

3. A valve as claimed in claim 1 with a pressure chamber connected to the fuel supply conduit recessed in the valve seat, the portion of the inner wall of said recess which is adjacent to said seat, the pressure chamber, and the opening of said fuel delivery conduit, all being situated in the seat concentrically to one another.

4. A valve as claimed in claim 1, in which said body consists of two parts, of which one comprises said recess for guiding said valve stem and a portion of said fuel supply conduit, while the other part comprises said seat, said fuel delivery conduit and the remaining portion of said fuel supply conduit, the latter extending in said second mentioned part removed from the surface thereof between its opening in the seat and its other opening adjacent to the portion of the supply conduit arranged in said first mentioned part.

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