

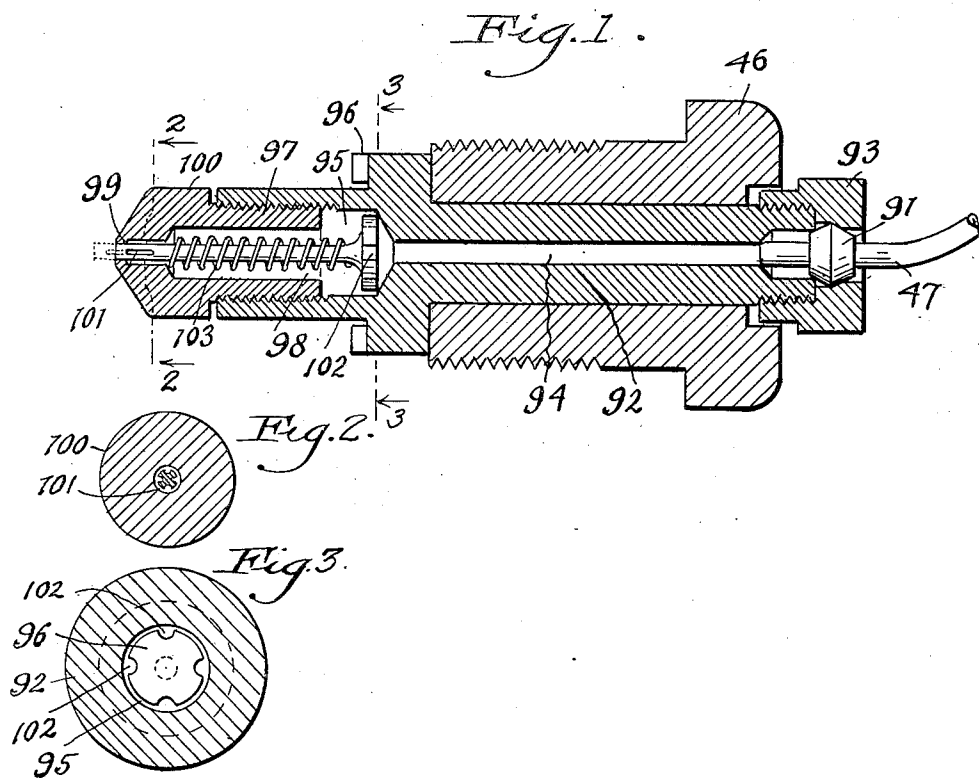
July 11, 1933.

R. H. WHITE

1,918,201

FUEL INJECTOR NOZZLE

Original Filed June 18, 1928



*Inventor*  
Rollin H. White  
Kearns Hudson & Kent  
attys.

## UNITED STATES PATENT OFFICE

ROLLIN H. WHITE, OF SHAKER HEIGHTS, OHIO

## FUEL INJECTOR NOZZLE

Application filed June 18, 1928, Serial No. 286,100. Renewed June 11, 1932.

This invention relates to improvements in fuel nozzles for Diesel engines.

One of the objects of the invention is the provision of an improved fuel nozzle so constructed as to automatically keep its small spray passages free from obstruction.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawing, in which—

Fig. 1 is a central longitudinal sectional view of a spray nozzle embodying my invention;

Fig. 2 is a transverse sectional detail view taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional detail view taken substantially on the line 3—3 of Fig. 1;

Referring to the drawing, the nozzle comprises a threaded plug 46 which is adapted to be screwed into an opening in an engine cylinder, it being understood that one or more of the nozzles may be employed for each cylinder. Fuel oil is conducted to the nozzle through a flexible or other tube 47. In order to make a tight connection between the tube and nozzle, the tube carries a relatively soft metal collar 91, which is pressed inwardly against the body member 92 of the nozzle by means of a nut 93. The body member 92 has an inlet passage 94 axially arranged, which connects at its forward end with a cylinder 95 in which a piston 96 is loosely mounted. This piston is carried by a stem 97 which extends axially through a passage 98 and into a constricted opening 99 through the tip of the nozzle, the tip being made preferably in a separable piece 100 threaded into the body member 92. At its extremity the stem 97 is round and has a close sliding fit within the round opening 99. Somewhat to the rear of its extremity, however, the stem 97 is provided with one or more relief passages 101. Hence, when the stem 97 is advanced in the nozzle, small quantities of fuel may be expelled through the opening 99 by way of relief passages

101. The piston 96 is provided with means to permit the passage of liquid from one side to the other thereof, and this means consists preferably in grooves or notches 102 cut into the periphery of the piston. The stem 97 and piston 96 are urged toward the right, as viewed in Fig. 8, by a coil spring 103.

The nozzle of this invention is intended for use in connection with an individual fuel pump or, where more than one nozzle is employed for a given cylinder, then in connection with the several nozzles for that particular cylinder. The pump operates at the proper time to exert a sudden strong impulse tending to feed oil through the nozzle. The pressure impulse thus created in the passage 94 of the nozzle, acting suddenly upon the piston 96, causes the same to move toward the left, as viewed in Fig. 1, compressing the spring 103, and carrying the relief passage 101 across the constricted opening 99. The compressed liquid within the nozzle is thus sprayed in a highly atomized condition into the combustion space of the engine cylinder. Immediately thereupon the pressure within the spray nozzle becomes equalized by the flow of liquid through the grooves 102 in the piston 96, and the spring 103 returns the piston 96 and stem 97 to the position illustrated in Fig. 1, where they remain until the next succeeding pressure impulse.

The use of very fine streams of fuel brings about a good atomization of the fuel, which is extremely important in an engine of this character, but the use of such fine streams makes the clogging of the passages therefor, due to carbonization of the fuel and the presence of foreign particles therein, all the more apt to occur. Hence my improvement, which permits the use of extremely fine fuel passages and maintains these passages open due to the mechanical movement of the stem 97, becomes of considerable importance.

While I have described somewhat in detail the illustrated embodiment of my invention, it is to be understood that various changes and modifications are within the spirit of the invention, and that the detailed

showing and description herein are not to be construed as limiting the invention.

Having thus described my invention, what I claim is:

5 1. In combination, a fuel nozzle having a connection for the reception of liquid fuel under pressure, said nozzle having a constricted exit opening, a stem having a close sliding fit in said opening, a piston carried  
10 by the stem within the nozzle in position to be acted upon by the pressure pulsations in the fuel line to advance said stem in said opening, said stem having therein a small relief passage located and arranged to bridge  
15 said opening in the advanced position of the stem only, and means for retracting said stem.

2. In combination, a fuel nozzle having a connection for the reception of liquid fuel  
20 under pressure, said nozzle having a constricted exit opening, a stem having an end portion with a cross section complementary to said opening, said end portion having a close sliding fit therein, a piston carried by  
25 the stem within the nozzle in position to be acted upon by the pressure pulsations in the fuel line to advance said stem in said opening, the surface of said stem normally to the rear of said opening being relieved to  
30 permit the passage of small quantities of fuel between the stem and opening when the stem is in its advanced position, and means for retracting said stem.

3. In combination, a fuel nozzle having a  
35 connection for the reception of liquid fuel under pressure, said nozzle having a constricted exit opening, a stem having a close sliding fit in said opening, that portion of the stem normally covered by the walls of  
40 said opening having a cross section complementary to said opening, whereby the passage of fuel through the opening is prevented, said stem having a second portion adjacent the first named portion which is  
45 longer than but of smaller cross sectional area than said exit opening to permit the

passage of small quantities of fuel, means tending to hold said first named portion of the stem in contact with the opening, and means responsive to pressure pulsations in the fuel line for moving said second named  
70 portion of the stem into position overlapping the exit opening at both ends thereof.

4. In combination, a fuel nozzle having a constricted cylindrical opening, a cylindrical stem slidable therein with an outer  
75 portion dimensioned to close said opening, and an inner portion of greater length but of less cross sectional area than said opening, a piston for said cylinder operatively connected with said stem, and a fuel inlet  
80 connection to said cylinder arranged to subject said piston to pressure impulses in the fuel line, whereby said stem is moved in said restricted opening to cause said inner portion to overlap said opening and permit the pas-  
85 sage of small quantities of fuel therethrough momentarily.

5. In combination, a fuel nozzle having a constricted opening, a cylinder in the nozzle in free communication with said opening, a  
90 stem having an outer portion slidable within but fitted to close said opening and an inner portion of greater length but of less cross sectional area than said opening, said nozzle having a fuel inlet connection to said  
95 cylinder on the end thereof opposite to said opening, a piston for said cylinder operatively connected with said stem, said piston being formed to permit relatively slow transfer of liquid from one side to the other there-  
100 of, and resilient means tending to hold said stem in its nozzle closing position, whereby pressure impulses in the fuel line act upon said piston to shift said stem momentarily  
105 against the action of said resilient means to cause said inner portion to overlap said opening for permitting the passage of small quantities of fuel through said opening.

In testimony whereof, I hereunto affix my  
110 signature.

ROLLIN H. WHITE.

50

115

55

120

60

125

65

130