Dec. 17, 1929. P. L'ORANGE 1,740,360

FUEL PUMP FOR INTERNAL COMBUSTION ENGINES

Filed Sept. 21, 1927

FIG. 1.

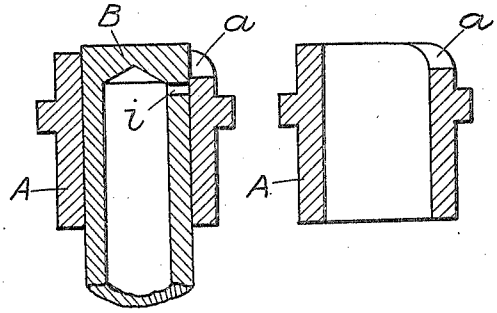


FIG. 2.

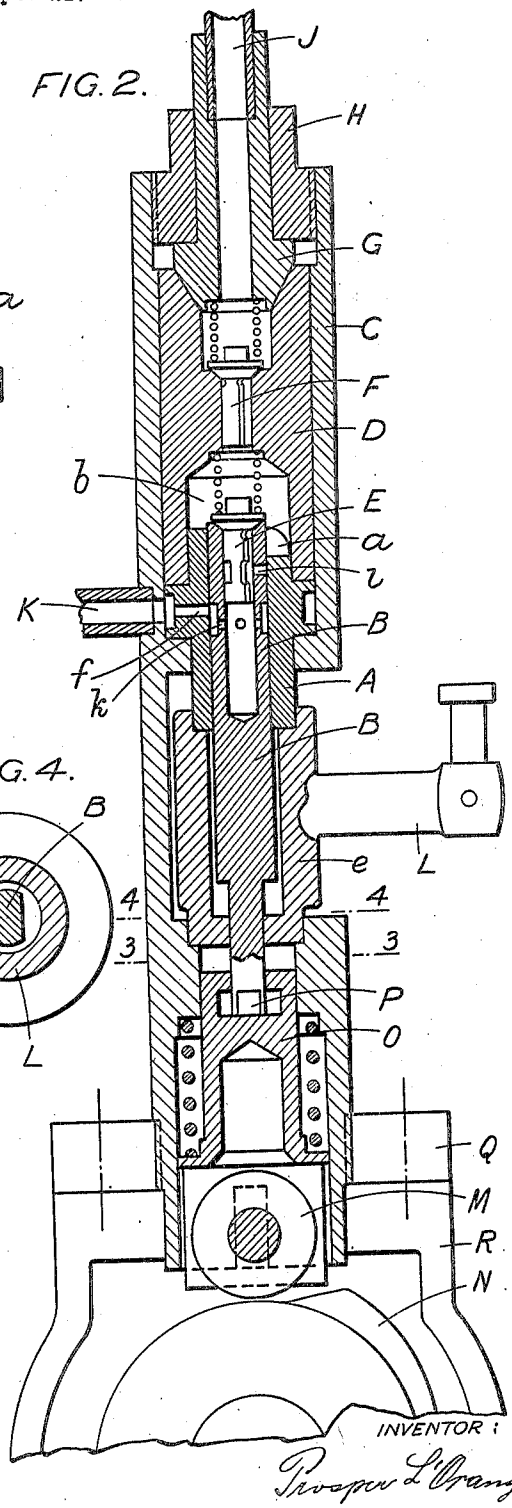


FIG. 3.

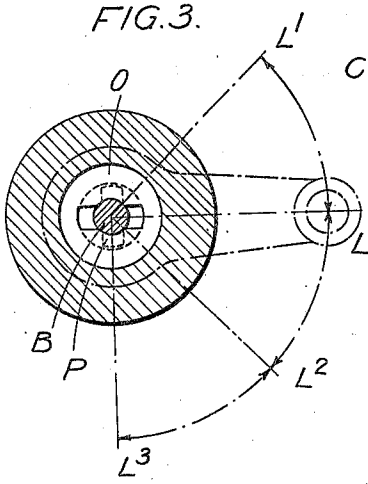
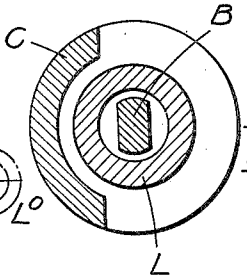


FIG. 4.



INVENTOR:

Privaper L'Orange.

Patented Dec. 17, 1929 1,740,360

UNITED STATES PATENT OFFICE

PROSPER L'ORANGE, OF MANNHEIM, GERMANY

FUEL PUMP FOR INTERNAL-COMBUSTION ENGINES

Application filed September 21, 1927, Serial No. 220,986, and in Germany September 22, 1926.

The fuel supply to internal-combustion engines of the Diesel type is generally regulated by means of separate valves or slides the control of which involves complicated structures which are of considerable resistance to the governor.

The object of the present invention is to produce a simple and easily operated fuel control, and the invention consists in furnishing the fuel pump with a hollow rotatable piston which is guided in a sleeve and provided with a lateral aperture which is normally closed by said sleeve and which is uncovered at the end of the pressure stroke for setting the compression chamber into communication with the suction pipe through the piston and interrupting the feed, the sleeve being provided with a helically inclined edge so as to allow the uncovering of the aperture to be advanced and retarded by a rotary adjustment of the piston.

The fuel is preferably fed through the piston to the compression space, the piston being adapted to carry the suction valve.

Fig. 1 of the accompanying drawings represents part sections of the piston and guide sleeve and of the sleeve alone, the piston being shown in its simplest construction.

Fig. 2, a longitudinal section of a pump according to the invention, fitted with a piston of modified construction,

Fig. 3, a cross-section on the line 3—3 of Fig. 2, and

Fig. 4, a cross-section on the line 4—4 of Fig. 2.

The pump piston B of the fuel pump of an internal-combustion engine of the Diesel type, is made hollow and provided with a lateral aperture *i* through which the compression space of the pump can be set into communication with the suction pipe through the piston for interrupting the feed of fuel. The piston is guided in a sleeve A whereby the aperture *i* is normally covered, the interruption of the feed being determined by the position of the edge of the sleeve relative to the path in which the aperture is moved. The edge of the sleeve is helically inclined, and the piston is rotatable so that the uncovering of the aperture *i* can be advanced and retarded to suit the load on the engine by a rotary adjustment of the piston.

Fig. 2 shows a complete pump construction according to the invention.

The pump casing C is supported by means of an adjustable nut Q on a frame R and guides in its lower end a spring-pressed pump actuating member O which bears by means of a roller M against the pump operating cam N. The sleeve A in which the pump piston B is guided is supported on a shoulder in the upper part of the casing and held in position by a valve sleeve D, a headed nipple G to which the compression pipe J is connected, and a nut H which closes the upper end of the pump casing. The suction pipe K communicates through the side of the pump casing with a duct *f* in the sleeve A and the piston has a wide peripheral groove through which and through apertures *k* the duct *f* communicates with the interior of the hollow pump piston. The upper end of the latter forms, in the construction according to Fig. 2, a seat for the suction valve E. The valve sleeve D is recessed to form a compression space above the guide sleeve A and is formed with a seat for the compression valve F. The casing C is cut open to admit a lever arm L connected to a boss which is held rotatably between the end of the sleeve A and the lower part of the casing C. The tail end of the piston B is flattened, as shown in Fig. 4, and passes through a corresponding aperture in the boss of the lever L so that the piston is compelled to participate in the rotary adjustment of the boss. The piston is coupled to the actuating member O by means of two diametrically opposite lugs P which are admitted through a keyhole aperture into an undercut recess in the end of the actuating member. In the normal position of the arm L (the position L^0 in Fig. 3) the lugs P are at 90° to the entrance position and allow the arm to be turned through 45° in either direction (positions L^1 and L^2) without severing the connection between the piston and the actuating member. When the lever is turned 90° from the normal position (position L^3 or diametrically opposite) the piston is free and can be withdrawn axially from the casing

after the removal of the nut H and the sleeve D.

When the piston descends, the valve E opens to admit the fuel into the compression space. On the commencement of the upward stroke of the piston, the valve E is closed and the valve F is thrust open, and fuel will be fed through the pipe J into the engine cylinder. As soon as the aperture *i* is uncovered by the edge of the sleeve A, communication will be established through the piston between the compression space and the suction pipe K, and the feed of fuel will be interrupted. As the edge of the sleeve A is helically inclined, the uncovering of the aperture *i* can, by a rotary displacement of the piston, be effected at different points of the pressure stroke, and the duration of the feed can thus be regulated to meet the load on the engine.

When the upper end of the piston is closed, as shown in Fig. 1, the pump must be provided with the ordinary valve arrangement.

I claim:

1. A fuel pump for internal-combustion engines of the Diesel-type, comprising a cylinder, having a compression space and an outlet passage leading from said space, a delivery valve in said passage, a reciprocating piston arranged in the cylinder coaxially with said valve and formed with an axial bore which communicates with the compression space, a suction valve seated in the orifice of the piston bore so as to close the communication normally, an inlet pipe communicating permanently with the piston bore, a guide sleeve for the piston arranged in the cylinder and formed with a helically cut end which confines the compression space in the neighbourhood of the piston, the piston being provided with a lateral aperture arranged so as to be normally closed by the guide sleeve and uncovered by the helical end of the latter at the end of the compression stroke so as to relieve the pressure through the piston bore and inlet pipe, and means for adjusting the piston about its axis so as to vary the angular position of the lateral aperture relative to the helical end of the guide sleeve.

2. The structure claimed in claim 1 in combination with an actuating member for the piston, and lugs on the piston whereby the latter is coupled to the actuating member so as to allow relative rotary displacement, piston and lug being admitted through a keyhole aperture into engagement with the actuating member.

PROSPER L'ORANGE.