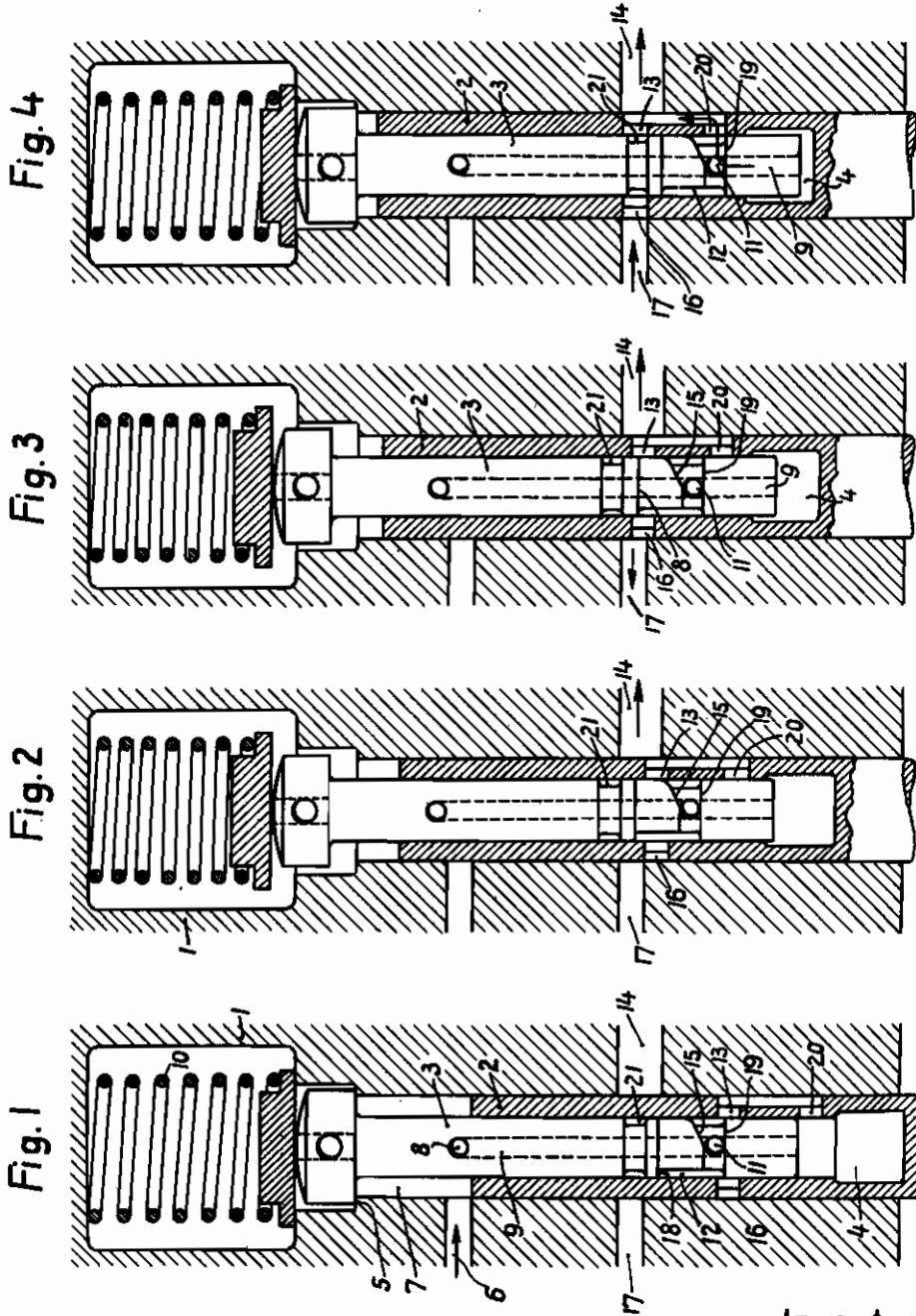


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Filed April 29, 1941

Serial No.
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2 Sheets—Sheet 1

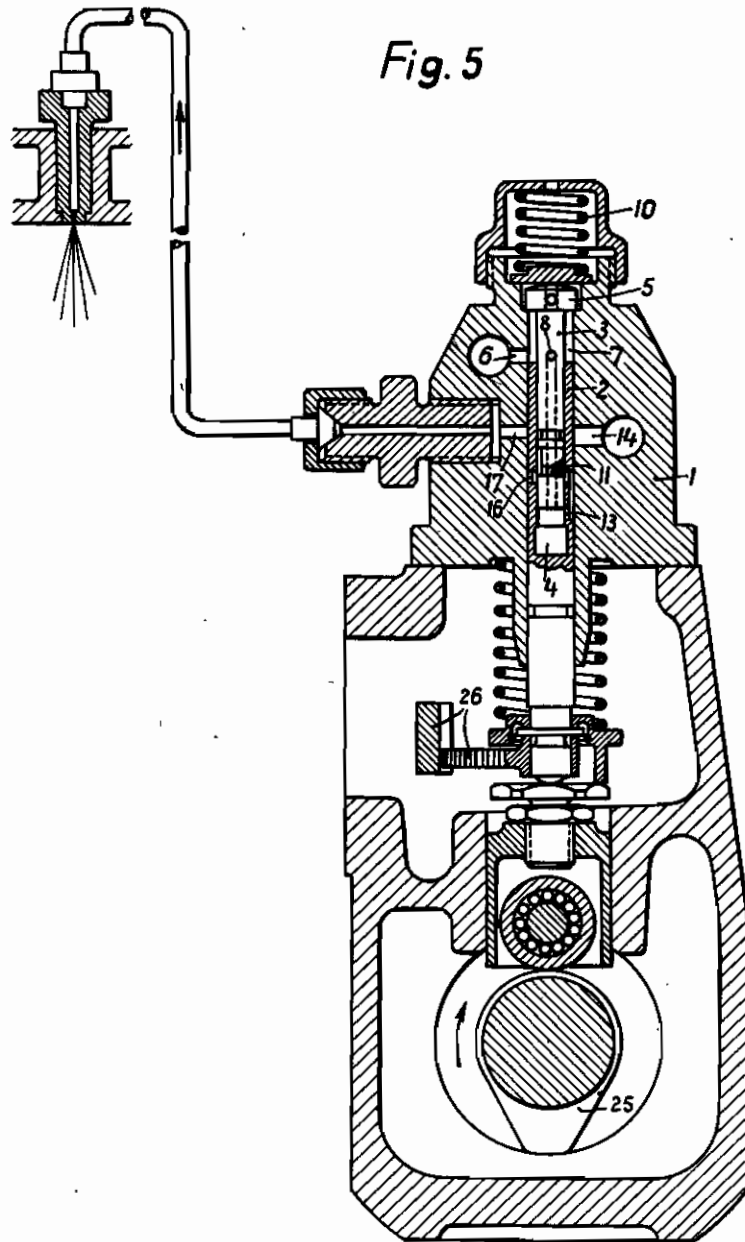


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ALIEN PROPERTY CUSTODIAN

FUEL INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES

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Application filed April 29, 1941

The invention relates to a fuel injection pump for internal combustion engines whose pump chamber occupies a position between a positively driven pump piston and a spring-loaded equalizing piston sliding in a longitudinal bore of the pump piston, and is, on the down stroke of the pump piston, connected with the injection port, by means of an opening in the piston wall, so that the equalizing piston injects the fuel and by its displacement in the pump piston again breaks the connection.

The invention consists in providing a cavity in the equalizing piston, which, after the equalizing piston has entirely or nearly broken the connection between the pump chamber and the high pressure injection conduit, connects the latter, for relieving the pressure therein, directly with a space of lower pressure.

In this manner a relief of the pressure conduit is obtained which begins, independently of the speed of rotation of the machine, immediately after the completion of the injection, and which remains uninfluenced by the pressure conditions prevailing in the pump chamber after the injection.

In the drawings are shown by way of example an embodiment of the invention, Fig. 1 showing a longitudinal section of the equalizing pump at the end of the suction stroke, Fig. 2 at the end of the overflow operation, Fig. 3 during the fuel injection, and Fig. 4 during the pressure relief.

A pump piston 2, positively driven by a cam (not shown), operated by the engine in known way, and extending into the pump housing 1, receives in a longitudinal bore the equalizing piston 3. The pump chamber 4 is in the interior of pump piston 2. During the downward motion of the pump piston, in which the equalizing piston resting on the annular shoulder 5 does not take part, the pump piston opens the suction port 6 in the pump housing and connects the same, through the annular space 7, the transverse port 8 and the longitudinal duct 9, with the pump chamber 4 (Fig. 1), so that the latter becomes filled with fuel. With the next upward movement of the pump piston, it first closes the suction port 6 and the transverse port 8 and carries along, through the medium of the enclosed fuel, the equalizing piston 3, accompanied by increased compression of the equalizing spring 10. Thereby

the fuel content of the pump chamber is put under pressure of the equalizing spring. With further continuation of the upward motion of the pump piston, the latter connects the pump chamber with the overflow channel 14, by way of longitudinal duct 9, cross bore 11, annular space 12 and opening 13. As a result of the consequent drop in pressure, the equalizing piston is moved downward under pressure of its spring, and thus discharges fuel into the overflow channel 14, until the inclined edge 15 of the equalizing piston has moved over the opening 13 in the pump piston (Fig. 2). The pump piston is, in a way well known per se, revolvable about its longitudinal axis, by means of a governor so that, according to the position of the inclined edge over the opening 13, the covering of the latter occurs sooner or later and thereby a larger or smaller quantity of fuel remains in the pump chamber, for the following injection. In the next instant, the pump piston connects the pump chamber with the fuel injection conduit 17 (Fig. 3) through longitudinal duct 9, cross bore 11, annular space 12 and opening 16. The equalizing piston then moves downward under the pressure of the equalizing spring and causes the fuel to be injected until the equalizing piston has covered the opening 16 by its guide ring or cut-off edge 18, and at the same time, or slightly before, its control edge 19 has opened the overflow opening 20, which connects the pump chamber with the overflow channel 14. As soon as the cut-off 18 has covered or almost covered the opening 16, the cavity 21, in the further progress of the downward motion of the equalizing piston, establishes a direct connection between the injection conduit 17 and the overflow channel 14 or other low pressure space, so that the injection pressure in the injection conduit drops quickly to the low pressure in the overflow channel (Fig. 4). As this relief is controlled by the injection-controlling equalizing piston, it occurs whatever the machine speed, always in direct sequence to the injection. Inasmuch as a separate relief is provided for the pump chamber through opening 20, the relief of the injection conduit is not delayed by pressure remaining in the pump chamber.

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