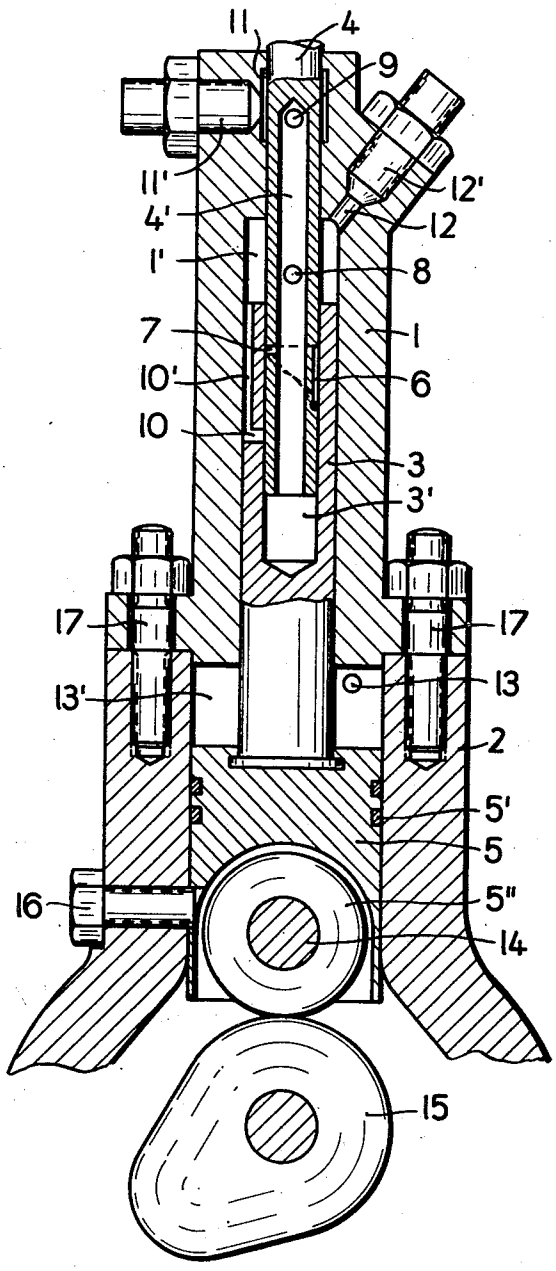
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CONTROL DEVICE IN FUEL INJECTION PUMP

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CONTROL DEVICE IN FUEL INJECTION PUMP

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The present invention relates to a control device in fuel injection pumps for internal combustion engines, said pump being of the cylinder and plunger type with intake and outlet ports.

According to the invention a control sleeve is inserted through the top of the cylinder and continues down into the axially bored-out plunger. Said sleeve is coordinated with corresponding ports and cavities in the plunger whereby by-passes are obtained whose opening and closing can easily be varied through axial and rotary adjustments of the control sleeve.

This by-pass arrangement eliminates the defects which have been prominent characteristics of fuel injection pumps up to date, especially noticeable by knocking in high speed engines at idling speeds and by both knocking and slowing down by sudden heavy loads with resultant loss of power. This control sleeve arrangement makes possible adjustments to all demands for the engine's varying speeds and loads and can if desired maintain constant speed regardless of variations in load when special arrangements are made for the rotary arrangement of the control sleeve. This then should be directly acted on by the variations in load. The axial adjustment should be varied by governor or manual arrangements proportional to the speeds of the engine.

The attached drawing in longitudinal cross section shows how this invention may be applied.

The pump cylinder 1 with fuel intake 11 and outlet 12 is mounted on a housing 2 in which the actuating cam 15 is located. In the pump cylinder the plunger 3 with an axial boring 3' is located. Said pump plunger has a port 10 and an exterior channel or cavity 10' which is connected with the port 10.

The plunger 3 is connected to a push plunger 5 provided with tightening rings 5' and a castor 5'' mounted on 14. A check 16 passes through the housing into an axial slot in the push plunger to prevent rotation of the pump plunger which is fastened to the push plunger.

The control sleeve 4 has an exterior cavity 6 located in the boring 3' of the pump plunger 3. The lower edge of this cavity 6 is helical. From this cavity the port 7 gives passage to the interior of the control sleeve which is, furthermore, provided with a port 8 located in the pressure chamber 1' when the plunger is down but is covered

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by the plunger when same moves upwards during the injection period. Furthermore the control sleeve is provided with a port 9 located in a chamber around the control sleeve in the pump cylinder top into which the fuel intake leads. Beyond this point to the exterior of the pump the control sleeve is closed.

The fuel oil enters at 11 and proceeds through the ports 8 and 9 in the control sleeve into the pump cylinder when the plunger moves downwards.

The injection to the injection nozzle through the outlet 12 starts at the moment when the plunger 3 on its way upward covers port 8 in the control sleeve and is determined by this port's elevation in the pump cylinder.

The injection is interrupted at the moment when port 10 in the pump plunger 3 passes the helical edge of the cavity 6 of the control sleeve, and this moment depends upon the rotary adjustment of the control sleeve. The fuel then passes from the pressure chamber 1' through the cavity 10', the port 10 in the plunger, the cavity 6 and the ports 7 and 9 in the control sleeve, back to the fuel tank connected to the intake 11'.

The control of the pre-injection is obtained by adjusting the control sleeve axially downward into the pump cylinder for early injection and upward for late injection, because this changes the position of port 8 relative to the plunger 3.

The duration of the injection period and hence the amount of fuel injected to the motor is determined by the rotary adjustment of the control sleeve because this changes the opening time for the by-pass through port 10 in the plunger and the helical cavity 6 in the control sleeve 4. The push plunger 5 connected to the pump plunger 3 is held down on the cam 15 by air pressure in the chamber 13', formed by the pump housing 2, the pump cylinder 1 and said plungers 3 and 5, from the pressure line at 13.

The threaded bolts with nuts securing the pump cylinder to the pump housing are designated by 17.

I claim:

1. In a fuel injection pump, the combination of, a pump cylinder having an outlet port and a fuel intake chamber a bore coaxial with and passing through both said intake chamber and said pump cylinder and having a diameter smaller

than said chamber and cylinder, a pump plunger slidably positioned in said cylinder, a bore passing through said plunger and positioned coaxial with said first mentioned bore, a port through the wall of said plunger communicating with a passage leading to the upper end of said plunger, a hollow fuel-control sleeve of such diameter that it will fit snugly but slidably in said bores and also be rotatable therein, a port in said sleeve adapted to be positioned to coincide with said port in said plunger wall whereby the quantity of fuel injected in an engine may be controlled by rotating said sleeve, a second port in said sleeve communicating with the end of said plunger whereby the timing of the fuel injection may be varied by sliding said sleeve in said bore, a third port in said sleeve positioned to communicate with said fuel intake chamber, said control sleeve having an outer closed end protruding out of said bore and

through the top of said cylinder, and means for adjusting the position of said sleeve by rotation and by sliding.

2. A fuel injection pump as recited in claim 1 in which means are provided to rotate said control sleeve in proportion to the variation in load on said engine.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,118,578	Trapp	May 24, 1938
2,282,562	Cole	May 12, 1942
2,286,928	Pipkin, Jr.	June 16, 1942
2,357,870	Beeh	Sept. 12, 1944