Chapter 14

HIGH PRESSURE FUEL PUMP, TYPE GD.110

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LIST OF ILLUSTRATIONS

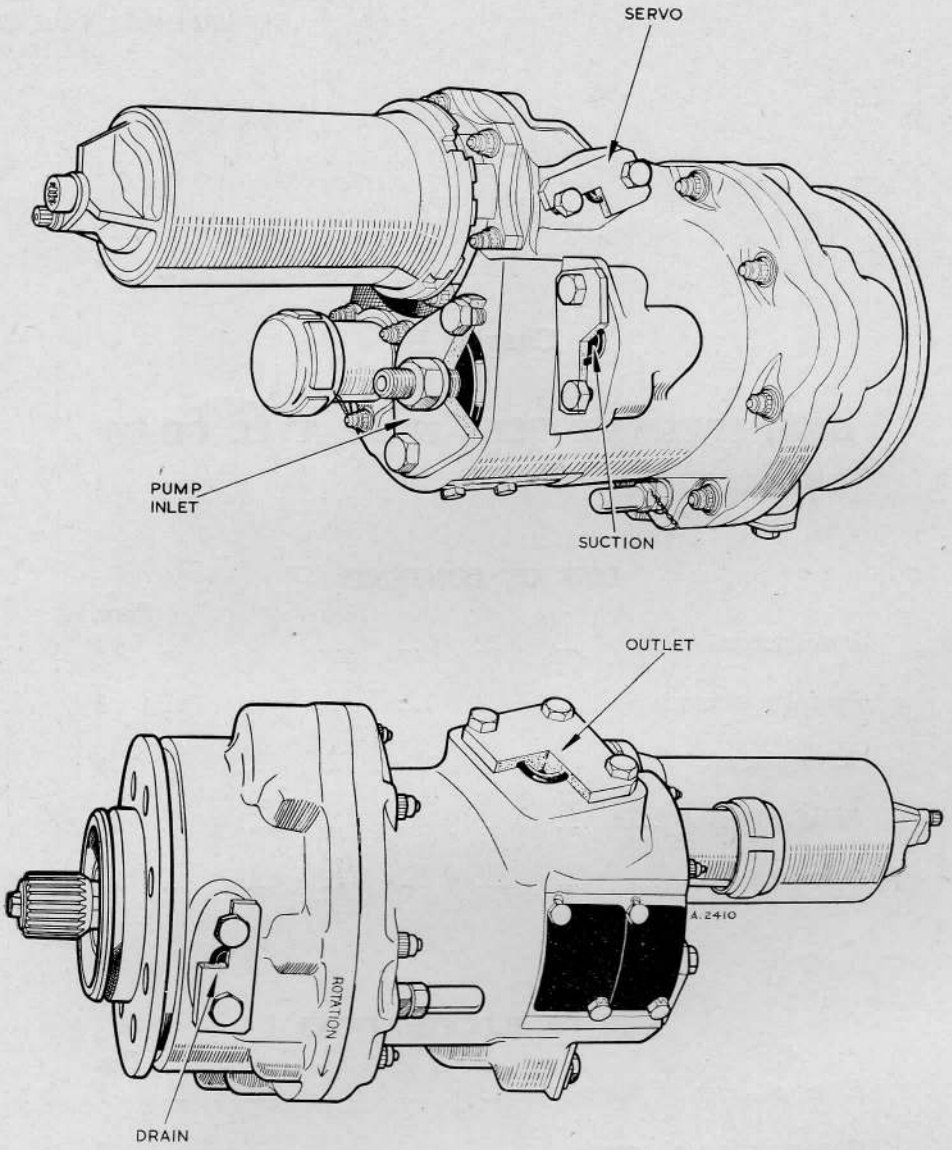

Fig. 1. External views of pump

Introduction

1. The high pressure (H.P.) fuel pump (fig. 1) provides a controlled flow of fuel to the fuel spray nozzles at varying engine speeds and altitude requirements. Control of the pump is effected by the fuel control unit via a servo piston which regulates the output.

2. The pump (fig. 2) consists of a pumping element, the servo piston and a relief valve; the design does not incorporate a governing device as this function is catered for by the fuel control unit and the L.P. shaft governor.

Pumping element

3. The pumping element comprises a

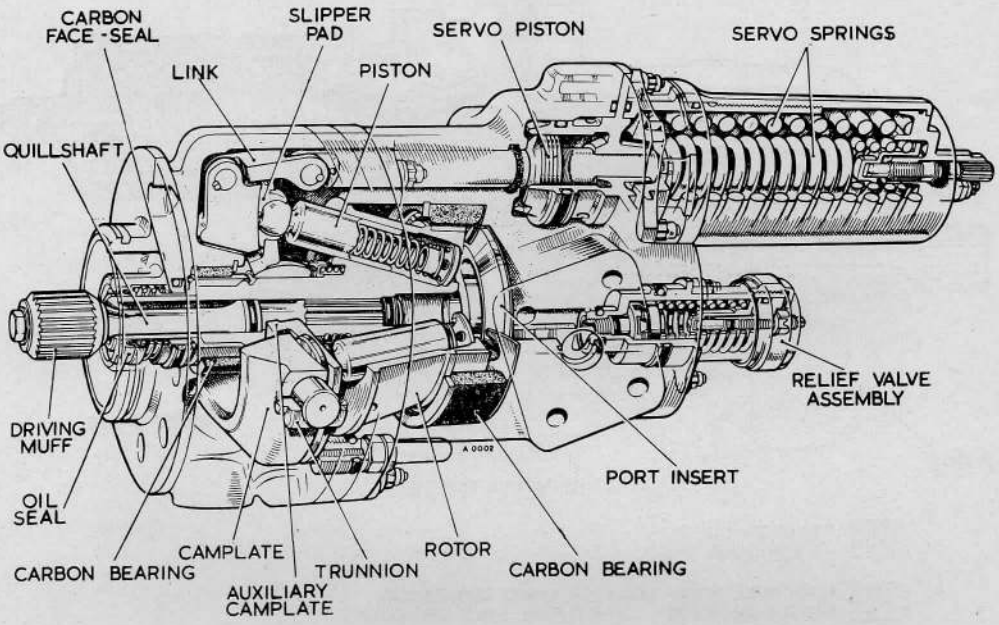

Fig. 2. Cutaway view of pump

conical rotor assembly which accommodates seven closely fitting pistons and is supported in two carbon bearings in the pump body. Each of the pistons mounts a slipper pad at its spherical end and is spring loaded against a camplate which is pivoted on two trunnions; lubrication between the slipper pads and the camplate is provided by high pressure fuel which passes through a small drilling in the end of each piston and pad.

4. The angle of the camplate relative to the axis of the rotor determines the stroke of the pistons and hence the output of the pump; it is the function of the servo piston to regulate this angle in accordance with the signals from the fuel control unit or L.P. shaft governor. Fuel input and output is through two kidney shaped ports machined in a port insert located in the pump body adjacent to the inner end of the rotor.

5. As a safeguard against possible occasional piston sticking, the slipper pads are mounted in an auxiliary camplate which rotates with the rotor assembly and ensures a controlled withdrawal of the pistons under all conditions.

Servo piston

6. The servo piston is connected to the camplate and has an enlarged portion, to one side of which is fed pump delivery pressure while the other side is subjected to a lower pressure (referred to as the "servo pressure").

7. The servo pressure is the overall pressure drop across the following orifices: —

Variable metering orifice (V.M.O.) (in the fuel control unit).

Pressure drop control orifice (in the fuel control unit).

Low pressure shaft governor.

8. A pair of springs assists the control pressure in balancing the pump delivery pressure, hence under steady running con-

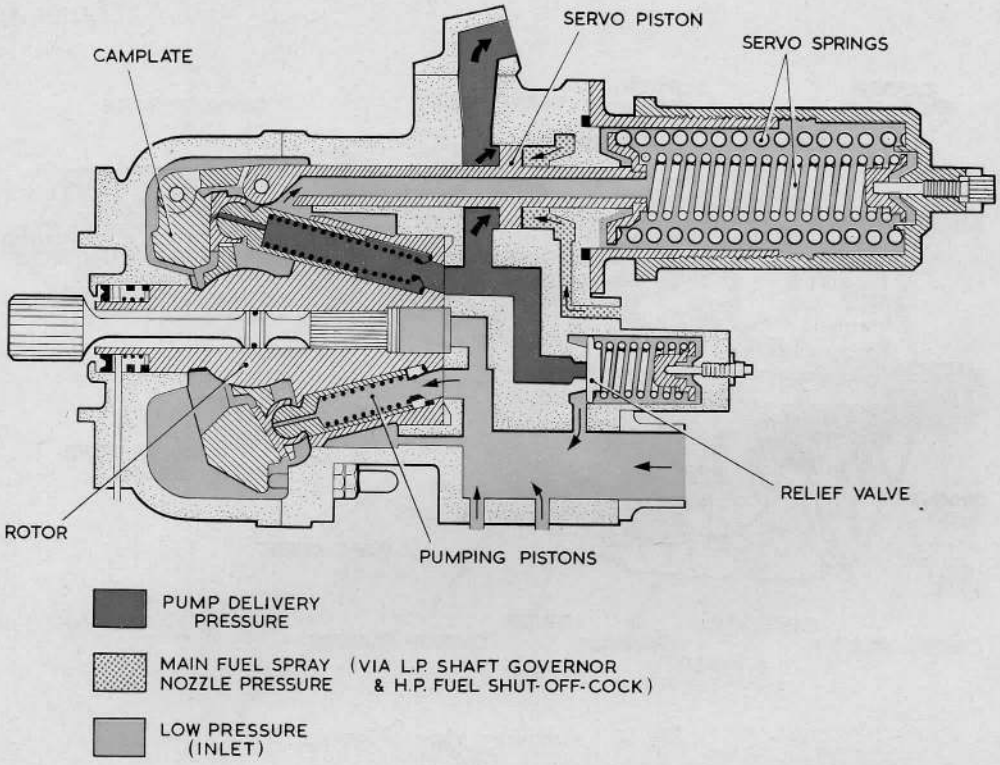

Fig. 3. Functional diagram of pump

ditions giving a constant pressure drop, the output will be constant.

9. In the event of a failure of the linkage connecting the servo piston to the camplate, the latter will automatically assume an angle of 90° relative to the axis of the rotor due to the fact that the tilting axis of the camplate is slightly offset. Under these conditions the pistons would be at zero stroke and the pump output would be nil.

Relief Valve

10. The relief valve is a spring-loaded valve that opens to permit relief to the pump inlet if a pre-determined maximum delivery pressure is exceeded.

Operation (fig. 3)

11. As previously explained, the amount of fuel expelled by the pistons during each cycle of rotation of the pump rotor is dependent upon the angle of the camplates; this angle is determined by the servo piston which is subjected to delivery pressure and to the servo pressure assisted by spring loading.

12. Under steady running conditions the servo piston will be in balance, but variations in the area of the orifices in the fuel control unit or L.P. shaft governor will alter the servo pressure, so causing the servo piston to move and hence alter the angle of the camplate and the stroke of the pumping pistons.

13. A reduction in the area of the orifices will cause an increase in the overall pressure drop of the fuel control unit and L.P. shaft governor; this will move the servo piston in order to decrease the angle of the camplate relative to the axis of the rotor, so decreasing the output. The reverse will occur if the orifice areas increase.

14. When the pump output is matched to the new requirements of the controls, the pressures on either side of the servo piston will again be in balance and the output from the pump will then become steady.