Chapter 18

PRESSURE FUELLING VALVE, Mk. 12, SERIES 1

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Current consumption	*0·30 amp. at 24 volts continuous rating*
Operating voltage limit	*21–28 volts D.C.*
Nominal operating voltage	*24 volts D.C.*
Resistance of solenoid coil	*80 ohms at 20 deg. C*

Introduction

1. The pressure fuelling valve, Mk. 12, Series 1 (Part No. 1112000/1) is an electrically operated differential valve which, when used in conjunction with a float switch and fitted in a fuel tank, automatically shuts off the fuel at a predetermined level. The valve electrical circuit may also contain a manual override switch to allow the fuel to be shut off when desired.

2. A more detailed description of the mechanical features and functioning tests will be found in A.P.4511, Vol. 1 and Vol. 6, Sect. 2, Chap. 3.

DESCRIPTION

General

3. The series 1 pressure fuelling valve (*fig.* 1) comprises a body barrel, containing the piston assembly, and a solenoid assembly. A union nut unites the two portions; the body barrel and piston assembly forming the upper half and the solenoid assembly the lower half of the valve.

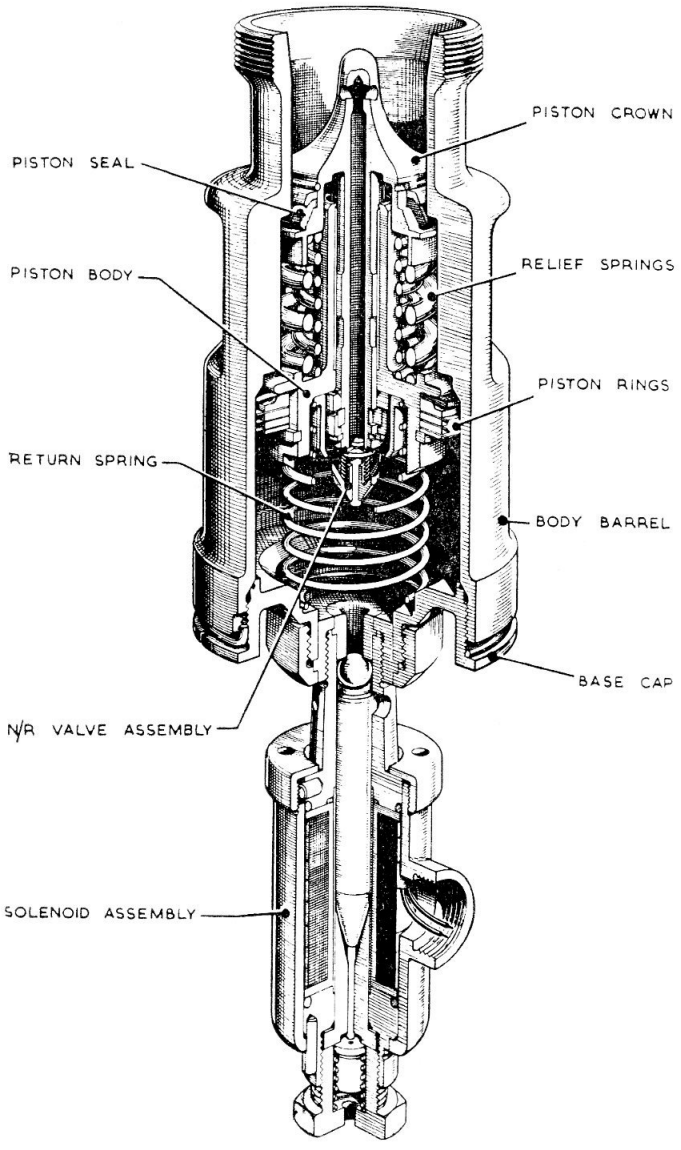

Fig. 1. Fuelling valve, Mk. 12, Series 1

Body barrel

4. Four outlet ports are arranged symmetrically around the body barrel, the bore of which has two steps machined in it to provide seatings for the piston crown and the piston body.

5. Four holes are drilled in the piston crown to communicate with the drilling through the piston crown stem ; this stem being fitted with a non-return valve. There are relief springs between the piston body and piston crown and a return spring is fitted below the piston body.

Solenoid assembly

6. The solenoid assembly (*fig.* 2) comprises a steel case containing the coil winding and a throat in which are six equally-spaced ports. The throat has a seating pressed into it and a $\frac{9}{32}$ in. steel ball is held against this seating by a spring loaded plunger, which slides in a liner inserted in the centre of the winding bobbin.

7. O-section sealing rings are used to prevent fuel from coming into contact with the coil winding and the wires supplying the current to this winding are led through a sleeve welded to the side of the case. Any fuel which may seep past the plunger into the base of the solenoid is prevented from forming a hydraulic lock by a hole which passes through the return spring retaining cap.

PRINCIPLE OF OPERATION

8. The principle of operation of the valve is illustrated in fig. 3 and is as follows :—

Static condition

(1) When fuel is not flowing, the solenoid is de-energized, the piston is held in the closed position by the return spring, and the rubber sealing ring on the piston crown seats against the upper step in the body barrel. The piston body seal is not seated against the lower step because there is no pressure in the lower chamber of the valve.

Flow condition

(2) When the solenoid is energized, the plunger is pulled down allowing the ball to lift off its seat. The fuel enters the valve,

causes the piston assembly to move downwards, and flows through the ports in the body barrel out into the tank. Fuel will also flow through the four holes in the piston crown, through the hollow stem and non-return valve into the lower chamber, and enters the tank via the ports in the solenoid throat.

Shut-off condition

(3) When the current to the solenoid is switched off, either by the action of a float switch or by a manual override switch, the solenoid return spring forces the ball back on to its seat and seals the lower half of the valve. Fuel will continue to flow through the hollow stem of the piston crown and the pressure on the piston crown will be the same as the pressure acting on the underside of the piston body and, because the area of the underside of the piston body is greater than the crown area, the piston will move upwards and close the valve.

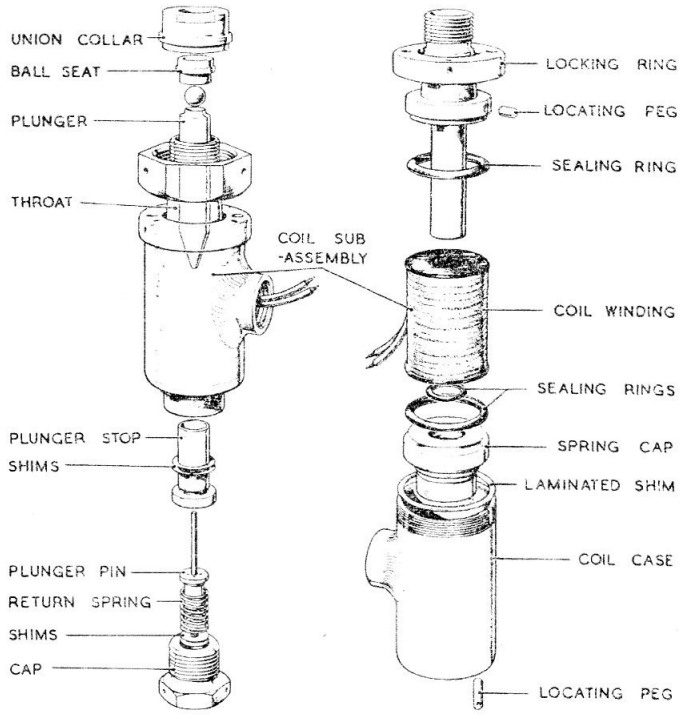

Fig. 2. Solenoid assembly—exploded

Relief condition

(4) If the inlet pressure rises above the shut-off pressure after the valve has closed, the relief springs between the piston crown and the piston body will compress while the piston body remains in its fully closed position. Thus damage to the main fuel lines is avoided because the fuel can now flow into the tank. The relief pressure of the valve is 55/65 lb. per sq. in. while the maximum line pressure will not exceed 50 lb. per sq. in.

Installation

9. An approved jointing compound may be used for fitting the valve into the tank, but it is important to ensure that no surplus compound is allowed to fall on to any part of the valve. It is also essential that a good bonding is established between the valve adapter and the tank shell.

SERVICING

10. The following paragraphs give details of electrical tests applicable to the solenoid unit of this valve. Servicing of the complete valve, including functional tests, is covered in A.P.4511, Vol. 1 and Vol. 6, Sect. 2, Chap. 3.

Testing

11. Measure the coil resistance of the solenoid coil winding; this must not be less than 80 ohms at 20 deg. C.

12. Ensure that the insulation resistance of the solenoid coil is adequate. The insulation resistance between any part of the valve and either of the two leads must not be less than 2 megohms measured with a 250-volt insulation resistance tester.

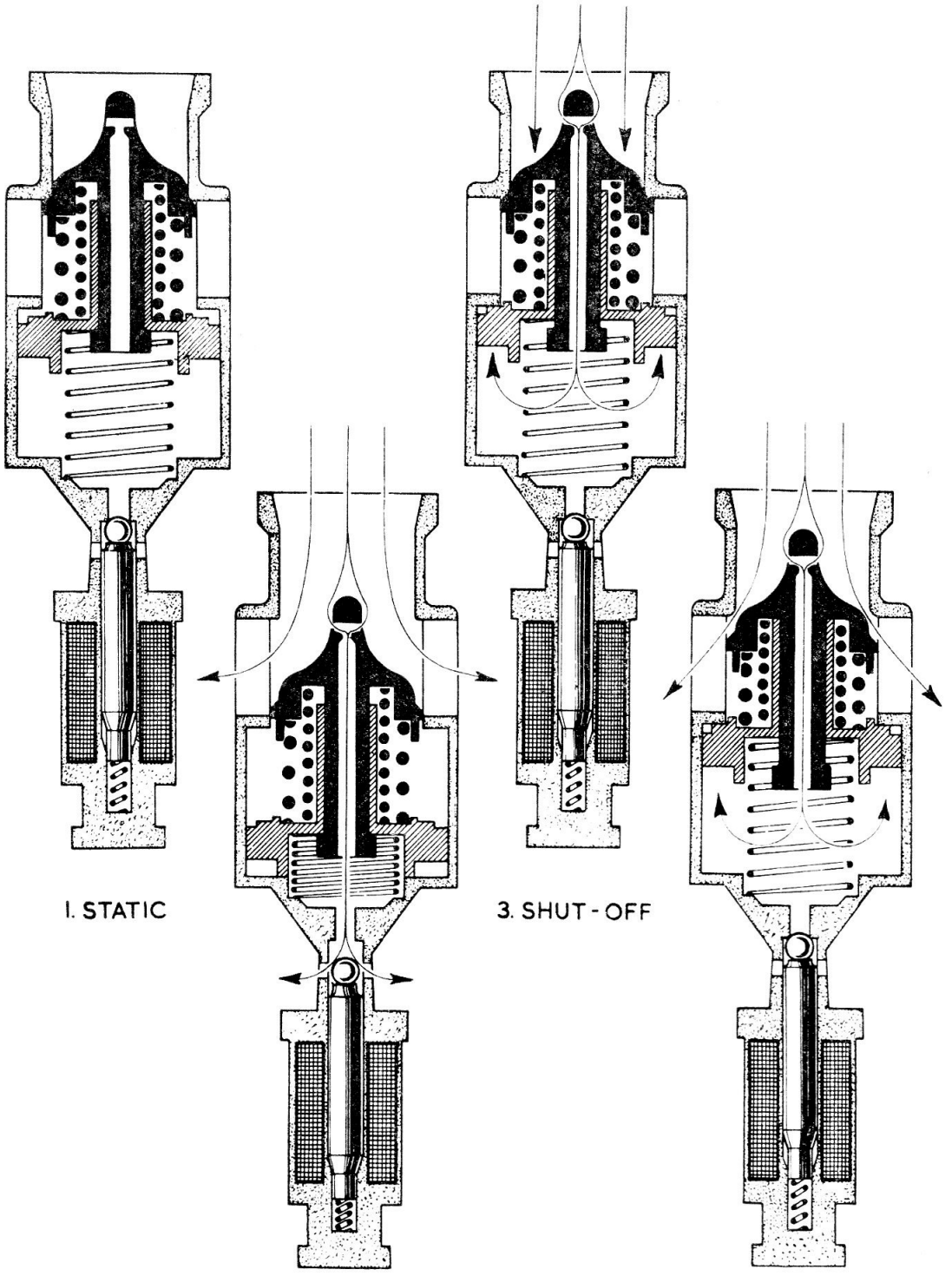

Fig. 3. Functional diagram