Chapter 8

PUMP, FUEL, FB SERIES

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LIST OF ILLUSTRATIONS

Introduction

1. The FB type of pumps are electrically driven, centrifugal units, designed to boost the fuel supply to the aircraft engine-driven pump under all conditions of fuel temperature, rate of climb, altitude, etc., which can be experienced in flight.

2. This type of pump can be fitted in either a vertical or horizontal position, and their different designs, subject to aircraft installation requirements, are such, that they will operate whether immersed in fuel within the tank, or, when fitted to the outside of the tank and secured to it by a reinforced flange.

DESCRIPTION

3. Each type of FB fuel pump comprises basically three main sub-assemblies, namely, the driving motor and casing, the pump body, and the pump base.

4. The immersed type of pump is designed to function when fitted within the fuel tank (fig. 1).

5. The external type of pump is designed to function when fitted to the outside of the fuel tank (*fig.* 2).

Driving motor

6. The fuel pump driving motor is of the high-speed, fractional horse-power, flameproof type, and operates either from a 24-volt or 112-volt d.c. supply, depending upon its designed voltage, and, subject to aircraft requirements, are fitted to the immersed and external type of pump. An additional requirement of the motor fitted to the immersed type of pump is that it shall be totally enclosed, so as to function efficiently while immersed in fuel within the tank. The armature, which is suitably supported in ball bearings, is designed with an extension to hold the pump impeller. The impeller is so designed that when the pump is in operation it draws fuel from the tank and forces it through the delivery outlet to the inlet side of the aircraft engine-driven pump.

7. The ball bearings are lubricated with anti-freeze, high-melting, low-freezing-point grease and are suitably shielded.

8. The field windings are shrunk into the motor casing, which is secured by screws to the pump body. The brushgear is of unit construction, with the brush boxes secured to an insulated carrier, and the complete unit is retained in position by screws, which also secure the spring contact assembly to the closed end of the motor casing.

Metal bellows gland

9. This fuel sealing gland, which is used largely throughout the FB group, is located on the armature shaft, directly above the impeller. The gland is fitted to prevent fuel seeping through to the motor lower bearing and causing damage to the motor performance. A fuel deflector is usually fitted above the fuel sealing gland and assists in deflecting any fuel leakage from the motor lower bearing.

10. The gland comprises a brass backplate, to which is sweated a brass bellows, with a bronze seal ring to the other end. The seal ring is guided by four splines cut round its outer circumference, and engaging with four lugs projecting from the backplate. These parts form a gland unit which is pressed into the pump casing. The bronze seal ring, which is stationary, rubs on a rotating carbon ring

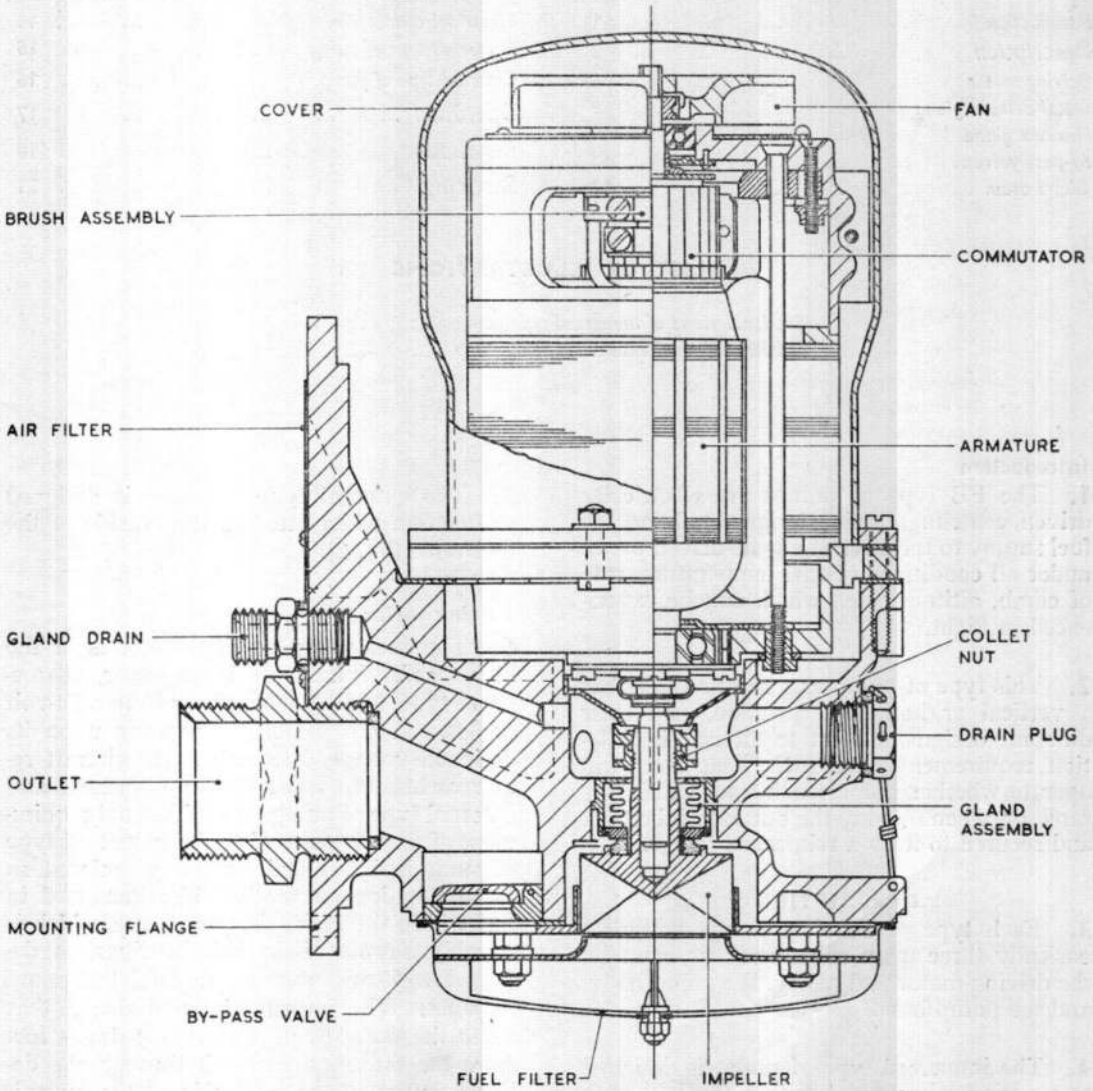

Fig. 1. Sectional views of immersed type pump

shrunk permanently into the back of the impeller.

Flexibox gland

11. In the later types of FB pumps the flexibox fuel sealing gland is fitted. This gland consists of a carbon ring which is fitted to the rotating impeller sleeve. The carbon ring rubs against a stationary steel-lapped face held by a spring at pre-determined pressure, thus preventing fuel seeping through to the lower motor bearing.

By-pass valve

12. A by-pass valve which is fitted in later FB pumps is located in a recess adjacent to the fuel delivery outlet duct. The valve is hinged to an annular flange, which ensures an efficient seating in the closed position. When the pump is idle, there is no pressure on the valve, allowing the valve to open, and the engine driven pump to continue to draw fuel from the tank.

Gland drain

13. Should there develop a fuel leakage past the sealing gland, a gland drain duct is designed within the pump to carry away any possible fuel seepage. The gland drain duct is closed with a suitable B.S.P. nut and is accessible for periodical inspection.

Electrical connection

14. The electrical input to the motor is via a Breeze-type plug and socket. The plug, which is an integral part of the pump, is usually fitted to a machined boss located on the pump body; this presents no difficulty with the external type of pump. With the immersed type of pump the plug is usually fitted to that part of the body which is accessible from the outside of the fuel tank. This

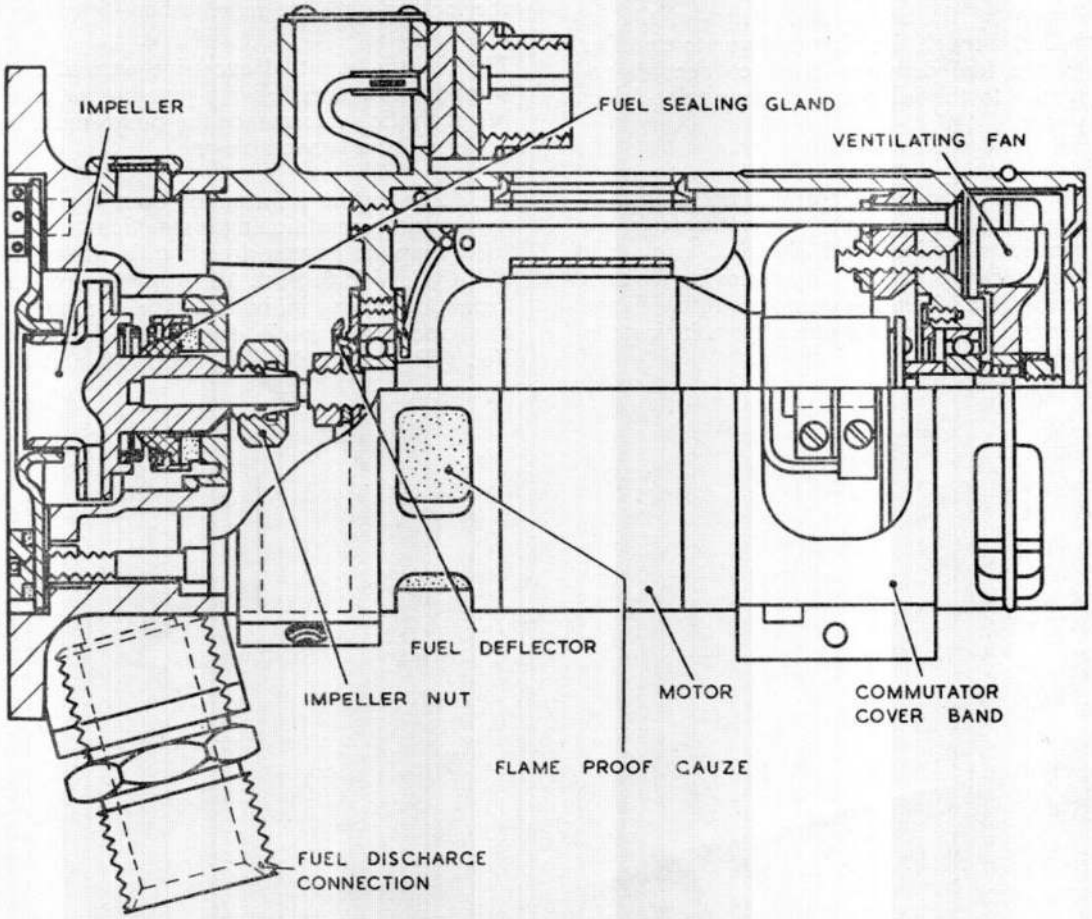

Fig. 2. Sectional view of external type pump

plug mates with the socket which carries the incoming supply cables.

Immersed type of pump

15. With the immersed type of pump the design is such that the electrical supply connection, gland drain, and fuel delivery outlet are fitted to that part of the pump which is accessible from the outside of the fuel tank.

External type of pump

16. This type of pump is designed to operate when secured by its mounting flange externally, with a flanged aperture in the fuel tank. The pump impeller is so positioned with the mounting flange, that, during operation, the impeller draws fuel from the tank and forces it through the delivery outlet to the fuel line of the aircraft engine-driven pump.

OPERATION

17. The FB type of pumps are basically the same in operation. On connecting the pump motor to its designed supply voltage, fuel is drawn by the action and design of the impeller, through the filter and volute chamber, to the fuel delivery outlet connection and thence to the inlet side of the engine-driven pump.

INSTALLATION

18. To remove the pump from its installation, shut off the supply from the tank, disconnect all pipes and electrical cable and socket from the pump. By removing the nuts, screws, etc., from the pump mounting flange, releases the complete pump from its installation.

19. When installing a new or reconditioned pump it is important that all transit caps and plugs are removed. When the pump has been installed all connections and union nuts must be wire-locked. Ensure that the gland drain is piped to atmosphere, and that the end of the drain piping faces towards the rear of the aircraft, to prevent possible pressurizing of the gland drain during flight.

20. Care must be exercised during removal or installation of a fuel pump that no damage is caused to the impeller.

SERVICING

21. Examine all pipe connections for leaks and fit new joint washers as necessary. The leakage from the gland drain should be noted when the pump is in operation; if the leakage is excessive, replace with a new or reconditioned pump.

22. Ensure that the electrical connection, pump nuts, screws, etc., are tight, and that the locking-wires are intact where fitted.

23. In the event of excessive current consumption, low fuel delivery pressure, or some other erratic performance the pump must be replaced by a serviceable one.

24. For further information on the general repair and reconditioning instructions for the FB group of pumps attention is drawn to A.P.4343, Vol. 6, Sect. 16, App. 1. For information on any individual type of pump of this group attention is drawn to A.P.4343D, Vol. 1, Book 2, and Vol. 6, Sect. 7, 8, and 10.