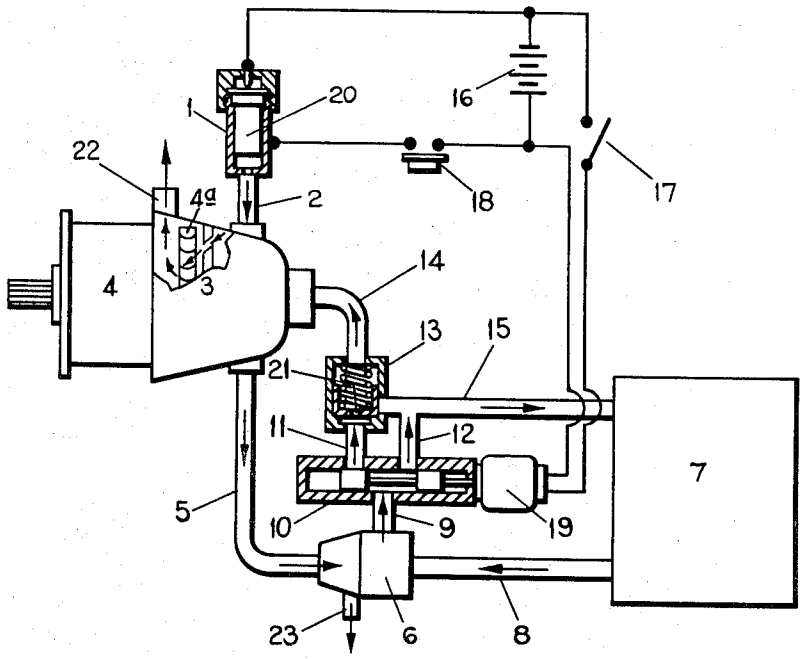
Feb. 7, 1956 D. R. TROWBRIDGE 2,733,569

SYSTEM FOR SUPPLYING LIQUID FUEL
TO A COMBUSTION CHAMBER
Filed Feb. 9, 1953



Inventor :-
David Roy Trowbridge
By :- William E. Bayly
Attorney.

United States Patent Office 2,733,569 Patented Feb. 7, 1956

2,733,569

SYSTEM FOR SUPPLYING LIQUID FUEL TO A COMBUSTION CHAMBER

David Roy Trowbridge, Elm Grove, Hornchurch, England, assignor to The Plessey Company Limited, Ilford, England, a British company

Application February 9, 1953, Serial No. 335,636

3 Claims. (Cl. 60—39.14)

This invention relates to a system for supplying liquid fuel to a combustion chamber.

When burning liquid fuels of the kind which will burn in the absence of air for example, a fuel of the general type known in the art as a "mono-fuel" in a combustion chamber to produce high velocity gases it has been found that if an electrically driven pump is used the current consumption to drive such a pump is high which requires the use of plant which is not only heavy but may occupy valuable space.

An object of this invention is to dispense with an electrically driven pump.

For the initial starting of the turbo-pump, a cartridge operated starting device fitted with a single or multiple breech may be incorporated in the system whereby the pressure of gas generated by the firing of a cartridge is supplied to the main combustion chamber and to the turbo-pump. The hot gasses produced also serve to ignite the fuel delivered to the combustion chamber from the pump and the pump will continue to operate by means of the gas pressure produced by the burning of the liquid fuel in said combustion chamber.

The cartridge must be designed to generate gas pressure for a sufficient length of time to start up the turbo-pump, and to keep it running until the liquid fuel is admitted to and burned in the combustion chamber to provide continuation of operation.

If desired a fuel control device may be operatively associated with the pump whereby fuel delivered to the combustion chamber is regulated.

The invention will now be described with reference to the accompanying drawing which illustrate one embodiment.

Referring to the drawing:

A cartridge firing mechanism **1** is connected by a passage or inlet 2 with a combustion chamber **3** having downstream therefrom a turbine *4a* for actuating a driven element 4.

The chamber 3 is connected by passageway **5** with a turbine driven pump **6**.

A tank 7 containing liquid fuel is connected to the inlet of the pump **6** by a pipe **8**, and the outlet from said pump **6** communicates via passage **9** with an electrically operated piston valve **10**. The valve **10** has two branch passages or discharge outlets **11** and **12**.

The branch passage **11** is attached to a flow control valve **13** and passageway **14** leading to the combustion chamber **3**. The other passage **12** is connected to a by-pass **15** leading from the control valve **13** back to the tank 7.

The control valve **13** is spring loaded to enable the valve to move under pressure of the liquid fuel so that excess fuel can flow through the by-pass **15** back to the tank 7. The amount of liquid fuel supplied by the pump **6** is generally in excess of normal requirements, consequently the spring loading of the control valve **13** is such that the correct amount of fuel can pass through the orifice **21**.

An electric circuit is provided for operating the system which contains a supply **16**, switch **17** and a press button switch **18**.

In operation the switch **17** is first closed to supply current to the solenoid **19** when the piston valve **10** closes the passage **12** and opens passageway **11**. Next the press button switch is depressed to detonate a cartridge **20** causing pressurized hot gases to be forced into the combustion chamber **3**. Some of these gases serve to drive the turbo-pump **6** thereby providing the initial starting of the turbine **4** and pump also causing liquid fuel to be drawn from the tank 7, through passage **9**, valve **10**, passageway **11**, orifice **21** in the flow control valve **13**, passage **14** to the combustion chamber **3** where it is ignited by the hot gases therein.

After the initial starting, both these elements continue to function by the supply of liquid fuel to the combustion chamber **3** and some of the combustion gases therefrom drive the pump **6**.

The exhaust gases from the combustion chamber **3** and turbo driven pump **6** are discharged through the respective exhaust pipes **22** and **23**.

To shut down the plant it is only necessary to open the switch **17** when the solenoid valve **10** closes the passageway **11** and opens passageway **12**, thereby shutting off the supply of liquid fuel to the combustion chamber and permitting fuel drawn from the tank 7 to be by-passed back again to tank 7 during the final stages of running down of the pump **6**.

I claim:

1. In a liquid fuel supply system, a cartridge firing device, a combustion chamber adapted to be initially supplied with pressurized exhaust gases from said cartridge firing device, a turbine downstream from said combustion chamber and adapted to receive combustion products therefrom to drive said turbine for actuation of an element operatively connected thereto, a turbo-pump, supplementary pressurized gas conducting means connecting said turbo-pump with said combustion chamber, a low pressure liquid fuel supply connected to said pump, and means including a flow regulating valve for conducting fuel from said pump to said combustion chamber.

2. In a liquid fuel supply system, a cartridge firing device, a combustion chamber adapted to be initially supplied with pressurized exhaust gases from said cartridge firing device, a turbine downstream from said combustion chamber and adapted to receive combustion products therefrom to drive said turbine for actuation of an element operatively connected thereto, a turbo-pump, supplementary pressurized gas conducting means connecting said turbo-pump with said combustion chamber, a low pressure liquid fuel supply connected to said pump, means for conducting fuel from said pump to said combustion chamber and including a by-pass connection to said fuel supply, an electrically actuated flow regulating valve in said conducting means for alternatively directing fuel to said bypass or to said combustion chamber, and a spring loaded flow control valve in communication with said regulating valve for controlling the quantity of fuel directed to said combustion chamber while simultaneously directing excess fuel to said bypass.

3. The liquid fuel supply system of claim 2 and including electrical means for actuating said cartridge firing device.

References Cited in the file of this patent

UNITED STATES PATENTS

2,447,758	Lubbock et al.	Aug. 24, 1948
2,457,595	Orr	Dec. 28, 1948
2,559,006	Clapham	July 3, 1951