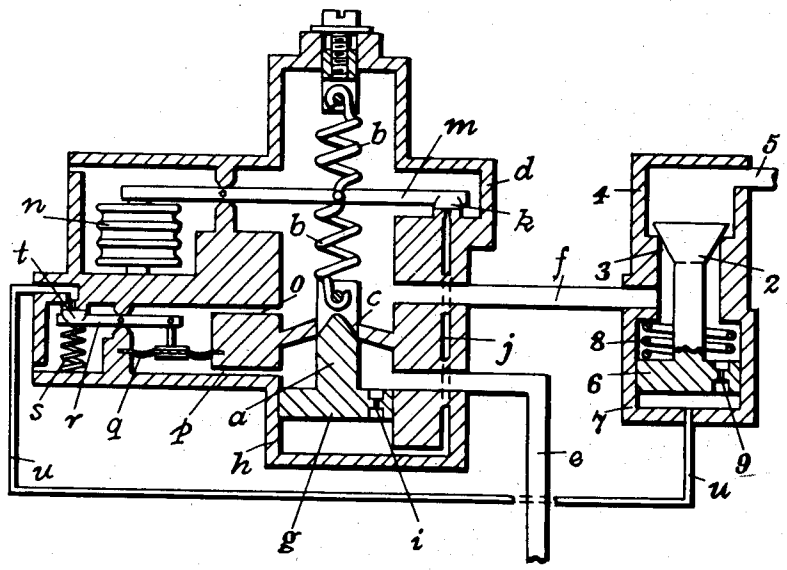
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LIQUID FUEL CONTROL MEANS FOR AERIAL BODIES OF THE RAM-JET TYPE

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LIQUID FUEL CONTROL MEANS FOR AERIAL BODIES OF THE RAM-JET TYPE

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1 Claim. (Cl. 60—39.28)

This invention relates to liquid fuel control means for aerial bodies of the ram-jet type, the said means being of the kind comprising a normally-closed throttle which is operable by a fuel-actuated servo-mechanism, the latter being controlled by a mechanism which determines the fuel-air ratio and is responsive to ram pressure.

The object of the invention is to provide a fuel control means of the said kind adapted to minimise risk of the fuel being temporarily supplied to the combustion chamber in an excessive quantity when the fuel supply is initiated.

A fuel control means in accordance with the invention comprises the combination of a primary and normally-closed servo-operated throttle, and a delayed-action and normally closed servo-operated secondary throttle arranged in series with the primary throttle.

The accompanying drawing illustrates diagrammatically one embodiment of the invention.

Referring to the drawing, the primary throttle consists of a plug *a* which is loaded by a spring *b* and is axially slidable in an orifice *c* in a chambered body part *d*. Fuel is admitted to the body part by a passage *e*, and discharged therefrom through a passage *f*, the two passages being situated at opposite sides of the orifice *c*. At one end of the plug *a* is formed a servo-piston *g* which is slidable in a cylinder *h*, the two ends of the cylinder being in communication with each other through a restricted orifice *i*. One end of this cylinder is in communication with the fuel supply passage *e*, and the other end communicates with a vent passage *j* which is controlled by a normally-closed valve *k*. The valve is carried by a lever *m* to which is attached the spring *b*, and one end of which extends into a chamber which is subject to dynamic air pressure or is connected to the combustion chamber, and this end of the lever is loaded by an elastic and evacuated capsule *n*.

The two sides of the orifice *c* associated with the plug *a* communicate by passages *o*, *p* with the two ends of a chamber which is divided into two compartments by a flexible diaphragm *q*, and to this diaphragm is attached a lever *r* one end of which extends into another chamber. The said end of this lever is loaded by a spring *s* and carries a valve *t* which controls a vent passage *u* associated with the secondary throttle.

The secondary throttle consists of a plug **2** which is axially slidable in an orifice **3** contained in a hollow body part **4**, the entrance to the orifice being in communication with the exit side of the corresponding orifice *c* of the primary throttle by way of the passage *f*, and the exit side of the orifice **3** of the secondary throttle being connected to a fuel pipe **5** leading to the combustion chamber. The plug **2** of the secondary throttle is secured at one end

to a servo-piston **6** slidable in a cylinder **7**, the piston being loaded by a spring **8** which initially holds the plug in its closed position. The two ends of the cylinder are in communication with each other through a restricted orifice **9**, and one end is open to the fuel passage *f* leading from the primary throttle. The other end of the cylinder is in communication with the passage *u* controlled by the vent valve *t* above mentioned. As an alternative to the piston **6** an equivalent flexible diaphragm may be provided for actuating the plug **2**.

Initially the servo-cylinders *h*, **7**, of the two throttles contain no fuel. When the fuel supply pump is brought into action fuel pressure acting on the upper side of the servo piston *g* of the primary throttle *a* compresses the air in the lower part of the cylinder *h* and causes this throttle to move to the open position against the action of the spring *b*, irrespective of any opening of the vent valve *k*. Fuel can then pass to the secondary throttle. But the fuel pressure then acting on the piston **6** of the secondary throttle holds the latter closed. Later, and after fuel has passed through the restricted orifice **9** to the other side of the piston **6**, pressure will build up to open the throttle **2**, as the liquid force then acting on the underside of the piston is greater than that acting on the upper side. Meanwhile, due to the excess opening of the throttle *a* the vent valve *k* will remain closed, and the throttle *a* will partially return to its closed position due to the restricted bleed of the fuel past the piston *g*, and the force exerted on it by the spring *b*, the final position of the throttle being determined by the air or other gas pressure acting on the capsule *n*. When a predetermined fuel pressure difference exists at the passages *o*, *p*, the valve *t* will be opened, causing the throttle **2** to be moved to the position at which it allows fuel to pass at the desired rate.

By appropriately adjusting the restricted orifice **9** and the differential areas of the piston **6** associated with the secondary throttle **2**, the action of the secondary throttle can be suitably delayed until the first throttle has taken up the position at which fuel can pass to the combustion chamber at the desired rate, this being determined by air or other gas pressure acting on the capsule *n* and the fuel pressure acting on the diaphragm *q*.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

A liquid fuel control means for an aerial body of the ram-jet type, comprising in combination a primary and normally closed throttle, a spring for moving said throttle to its closed position, a servo-mechanism for moving said throttle to its open position, a valve for controlling said servo-mechanism, means responsive to gas pressure for actuating said valve, a delayed action and normally closed throttle arranged in series with said primary throttle, a second spring for moving said delayed action throttle to its closed position, a second servo-mechanism for moving said delayed action throttle to its open position, a second valve for controlling said second servo-mechanism, and means responsive to a fuel pressure difference associated with said primary throttle for actuating said second valve.

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