May 9, 1961 F. W. WALLMAN, JR 2,983,266

FUEL METERING DEVICE FOR MINIATURE INTERNAL COMBUSTION ENGINES

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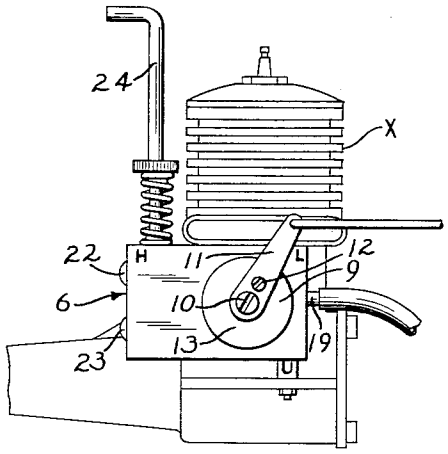


FIG. 1

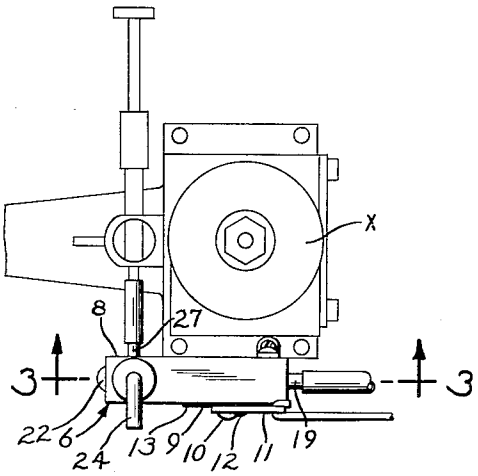


FIG. 2

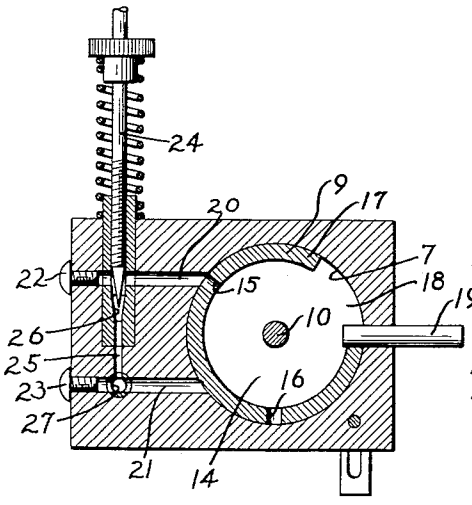


FIG. 3

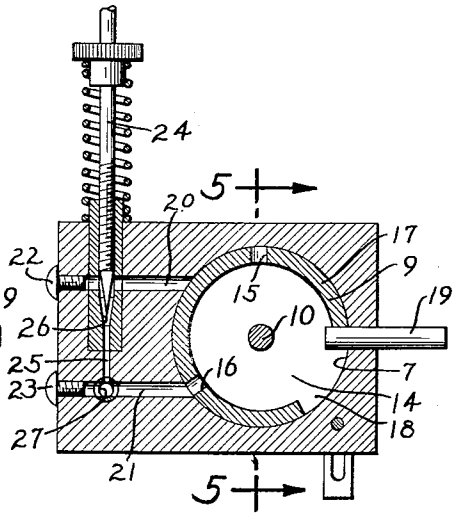


FIG. 4

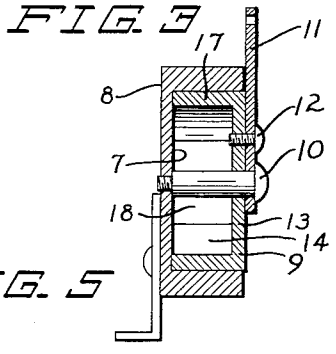


FIG. 5

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FUEL METERING DEVICE FOR MINIATURE INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 123—119)

This invention relates broadly to fuel metering devices and particularly, to a fuel metering device imparting speed and shut-off control to miniature internal combustion engines.

The principal object of this invention is to provide higl speed and low speed and shut-off control for any glow plug type miniature internal combustion engine as used for model aircraft and the like.

This and other objects of the invention will become apparent from the following specification and claims taken in conjunction with the appended drawings which form a part of this application, and in which, like characters indicate like parts throughout the several views.

To the above end, generally stated, the invention consists of the following devices and combination of devices, hereinafter described and defined in the claims.

Referring to the drawings:

Fig. 1 is a side elevational view of the invention mounted on a miniature internal combustion engine, diagrammatically illustrated.

Fig. 2 is a top plan view of the parts shown in Fig. 1.

Fig. 3 is a sectional view in side elevation taken on the line 3—3 of Fig. 2, and showing the fuel port in communication with a needle valve.

Fig. 4 is a view similar to Fig. 3 with the exception that the needle valve is by-passed, and

Fig. 5 is a sectional view in end elevation taken on the line 5—5 of Fig. 4.

The reference character X indicates a conventional miniature internal combustion engine of the type employed to power model aircraft and the like, and referring specifically, to the instant invention, the numeral 6 is directed to a stationary body member substantially rectangular in shape and constructed and arranged to be interposed in the fuel system of an engine of the type described herein, between the fuel supply tank, not shown, and the air intake passage of said engine.

A relatively large, transverse cylindrical bore 7 is formed in one side portion 8 of the body portion 6 affording a mounting station for a flanged cylindrical member 9 which has a close working fit with the bore 7, in the body member 6. The cylindrical member 9 is mounted in said bore 7 for reciprocal rotary movements about a horizontal axis by means of a sleeved bolt 10 which has screw threaded engagement with the side portion 8 of the body member 6. Said bolt 10 also affords the primary mounting means for the lever arm 11 on the cylindrical member 9. A short screw 12, having screw threaded engagement with the outer surface of said cylindrical member 9 cooperates with the sleeved bolt 10 to rigidly secure the lever arm 11 to the outer surface 13 of the member 9.

It is important to note here that the bore 7 and the cylindrical member 9 mounted therein, cooperate to provide a closed chamber 14 which is provided for a purpose that will presently appear.

From a manufacturing standpoint, it is also important to note that the depth of the inwardly projected flanged

portion of the cylindrical member 9, is very slightly greater than the depth of the bore 7 to thus afford working clearance between the outer end portion of the lever arm 11 and the adjacent surfaces of the body member 6 as the member 9 and its mounted lever arm 11 are moved about a horizontal axis. It will be obvious, that by the use of a sleeved bolt 10 to mount the member 9 in the bore 7, will afford means whereby the member 9 will always have a close working adjustment in its mounted position in the bore 7. The shoulder of the sleeved bolt 10 impinges the inner surface of the side portion 8 of the body 6 to afford a stop for the bolt 10 and allow for proper working clearance for the members which it mounts.

Upper and lower discharge ports 15 and 16 respectively, in the form of a pair of spaced transverse bores, are formed in the flanged portion 17 of the member 9, and a segment 18 of said flange is open to afford selective communication with a fuel intake port, which, as shown, comprises a nozzle 19, mounted in the intake end portion of the body member 6. This nozzle 19, projects inwardly, into the chamber 14 through the open segment 18 of the member 9 and thus affords a stop to limit the manually imparted reciprocal rotary movements of the member 9.

Upper and lower longitudinally disposed fuel passageways 20 and 21, are formed in the body member 6 and extend substantially, from the transverse center of the discharge end portion of the body 6. As a manufacturing expedient, these passageways 20 and 21 extend from the chamber 14 completely through the body member 6 but are closed to atmosphere by a pair of screws 22 and 23 which have screw threaded engagement with the outer end portion of said passageways, to seal the same.

The opened segment 18, in the rotatable cylindrical member 9 with movement of the latter, limited by the projection of the nozzle 19, into the chamber, is so constructed and arranged so as to position the discharge port 15 and the passageway 20 in register, the one with the other, when the lever arm 11 is manually moved to the position shown in Fig. 3, and thus permits an unrestricted flow of fuel from the nozzle 19, into the chamber 14, the port 15, and the passageway 20, where said fuel is then metered, as will presently be described. Conversely, as the lever arm 11, is moved into the position shown in Fig. 4, the port 15 is closed by the flanged portion 17 of the rotatable member 9, and the port 16 and the passageway 21 are brought into register for a purpose that will presently become apparent.

It may be noted at this point that with the lever arm 11, in an upright vertical position, both ports 15 and 16 are closed by the flange 17 of the rotatable member 9 and the flow of fuel is thus restricted to the chamber 14 and the engine X will stop for lack of fuel.

A conventional needle valve 24 is mounted in the body member 6 through the top thereof and has communication with the passageway 20, and a relatively narrow restricted passageway 25, connects the seat portion 26 of the needle valve 24 with the passageway 21. A discharge port 27 is in direct communication with the passageway 21 and leads directly and unrestrictedly to the needle valve housing of the engine X.

In describing the operation of the metering device described and claimed herein, reference will hereinafter be made to the high and low position of the operating lever arm 11 which appear on the drawing in the form of reference characters H and L respectively, on the side portion of the body member 6. In making reference to the H position, reference is had to the alignment of the port 15 and the passageway 20. Conversely, with reference to the L position of the lever arm 11, reference is had to the alignment of the port 16 and the passageway 21.

Operation

With the lever arm **11** in H or high position, fuel from the supply tank, not shown, enters the chamber **14** via the intake nozzle **19**, flows through the upper port **15**, and the passageway **20** to the needle valve **24** where said fuel is metered by said needle valve to a lean two cycle mixture resulting in high speed engine operation. The metered fuel is then ported via the passageway **25** and the discharge port **27** to the needle valve housing of the engine X.

Conversely, with the lever arm **11**, in L or low position, fuel from the supply tank, not shown, upon entering the chamber **14** via the intake nozzle **19**, flows through the lower port **16** and the passageway **21**, by-passing the needle valve **24** and then directly through the discharge port **27**, to the needle valve housing of the engine X. Said fuel, being metered by the needle valve on the spray bar of the engine X for a rich fuel mixture resulting in slow speed engine operation. Obviously, with the unit set as described, the setting of the needle valve **24** would have no effect upon engine operation.

When the lever arm **11** is set in substantially vertical position relative to the mounted unit, both ports **15** and **16** will be closed or out of register with either passageway **20** or **21**, thereby stopping the flow of fuel to the engine X which will then stop when the present supply of fuel in the lines beyond the chamber **14** is exhausted.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts, may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What I claim is:

1. A fuel metering device for miniature internal combustion engines of the glow plug type, comprising in combination, a body member, interposed in a fuel line between a supply tank and the air intake passage of said engine, a fuel chamber, and fuel passageways in said body member, a movable member mounted in said body member and ports in said movable member having selective communication with the passageways in the body member, means integral with said movable member whereby the said ports therein are moved into register with the passageways in the body member to selectively afford passage of fuel in the chamber via one of the ports and one of the passageways to the air intake passage of the engine, fuel metering means in at least one of said passageways for controlling the fuel mixture, and manual means integral with the movable member to selectively position one of said ports with its cooperating passageway.

2. The structure defined in claim 1 further including stop means integral with the movable member, whereby, one of the ports in said member is selectively moved into register with one of the passageways in the body member to afford an unrestricted fuel passageway from the chamber in the body member, said stop means and the ports in the movable member being constructed and arranged so as to allow alignment of only one port and its cooperating passageway while the other of said ports and passageways are sealed out of register against the passage of fuel.

3. A fuel metering device for miniature internal combustion of the glow plug type comprising in combination, a fixed body member interposed in the fuel system of said engine between the fuel supply tank and the air intake passage of said engine, a fuel chamber in the body member, upper and lower fuel discharge passageways in the body member connecting said chamber to a fuel discharge port in the body member, an interconnecting passageway affording communication between the first noted passageways, and means in at least one of said passageways to meter and control the fuel mixture, a rotatable member mounted in the fuel chamber for reciprocal movement about a horizontal axis, at least one port disposed about the circumferential surface of the rotatable member and extending through said surface into the chamber, stop means integral with the rotatable member to limit the reciprocal movement of said member about the axis thereof, said stop means cooperating with a stop member in the body member constructed and arranged to selectively position, independently, one of said ports with one of said passageways for the flow of fuel therethrough from the supply tank via the chamber and its connecting passageways, and metering and control means in at least one of said passageways.

4. The structure defined in claim 3 wherein the fuel control means in one of the passageways is a needle valve whereby the said fuel mixture in communication with said needle valve is metered to the engine to afford a lean mixture.

5. The structure defined in claim 3 wherein the ports in the movable member and the passageways in the body member are constructed and arranged to bring one port and one passageway into register, and in which adjustment, a second port and a second passageway are out of register to allow for the passage of fuel via a single port and its cooperating passageway to the engine.

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