Jan. 2, 1940. A. L. PARKER 2,185,564

ENERGIZER FOR GAS ENGINES

Filed Nov. 30, 1938

FIG. 1.

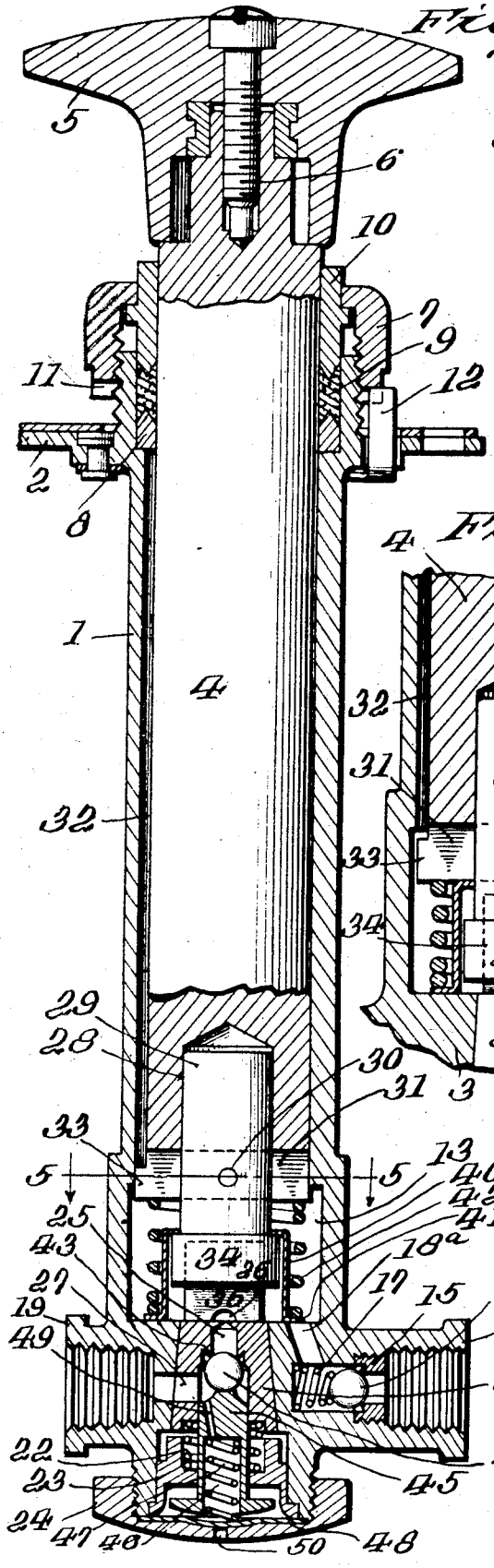


FIG. 5.

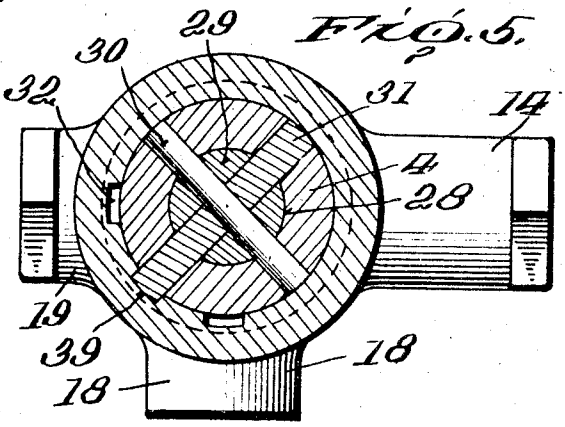


FIG. 2.

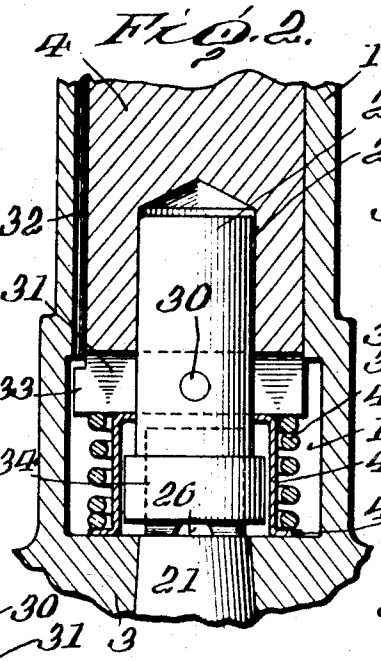


FIG. 3.

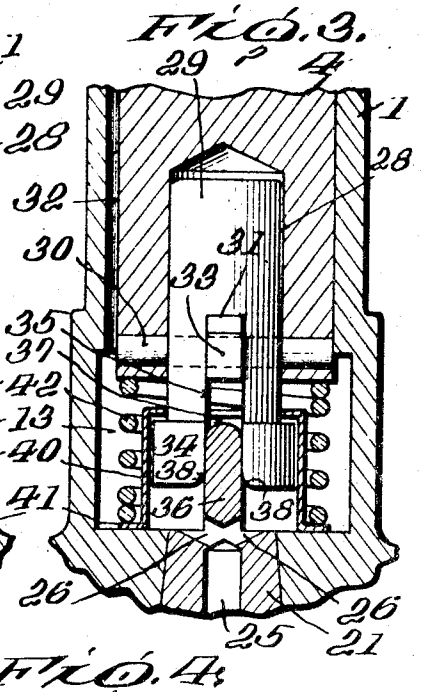
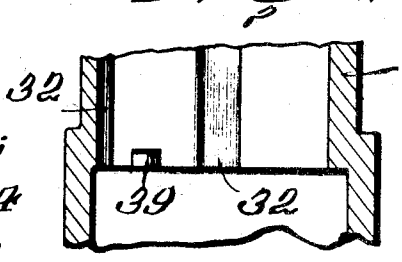


FIG. 4.



Inventor

Arthur L. Parker

By Mason & Porter

Attorneys

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ENERGIZER FOR GAS ENGINES

Arthur L. Parker, Cleveland, Ohio

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5 Claims. (Cl. 103—2)

The invention relates to new and useful improvements in an energizer for gas engines, which device is particularly adapted for operation as a primer in the starting of the engine.

An object of the invention is to provide an energizing device for dispensing fuel to a selected cylinder or cylinders of a hydrocarbon engine, or to one or more of a series of hydrocarbon engines.

In the carrying out of the invention, a pump is used comprising a casing and a piston which may be reciprocated therein, with which casing is associated a valve housing and a valve adapted to be turned for selectively distributing the fuel. The turning of the valve to a set position is accomplished by rotating the pump piston. The valve is locked in an off position by locking the piston against rotation while still in engagement with the valve, and the piston is yieldingly held in locked position by a spring housed within the pump casing.

Referring more in detail to the drawing—

Fig. 1 is a longitudinal sectional view through the pump casing and the valve housing;

Fig. 2 is an enlarged longitudinal sectional view through the inner end of the pump casing and showing the piston connected up to the valve and the control key disengaged from the casing so that the valve may be rotated;

Fig. 3 is a view similar to Fig. 2, showing the piston slightly retracted and the control key housed in the recess for holding the valve in off position;

Fig. 4 is a sectional view showing a portion of the pump casing and two of the keyways and also the locking recess, and

Fig. 5 is a sectional view on the line 5—5 of Fig. 1.

In the illustrated embodiment of the invention, the gas energizer consists of a pump barrel or casing 1 which is provided with a flange 2 used for the mounting of the pump on the cowl of an airship or any other suitable place where the device is to be used. The casing is provided with a valve housing 3, which as shown, is formed integral with the casing, although it may be detachably connected to the barrel of the pump.

Mounted for reciprocation in the pump barrel or casing 1 is a piston 4. The piston, as shown, is a solid metal piece having a close sliding fit with the inner surface of the pump casing 1. Attached to the outer end of the piston rod is a handle 5. Said handle is secured to the piston by a suitable holding screw 6. The outer or left hand end of the pump casing, as shown in Figure 1, is closed and sealed by a cap member 7 which has a threaded connection with the casing. The casing has a recess surrounding the piston in which is located a ring 8. Contacting with the ring 8 is an annular packing 9 and contacting with the packing 9 is a metal sleeve 10 having a laterally projecting shoulder which is engaged by the cap member 7. The inner edge of the cap member 7 is provided with notches 11 and a spring locking dog 12 secured to the flange 2 of the casing 1 engages the notches so as to yieldingly hold the cap member 7 in a set position, firmly pressing the sleeve 10 against the packing 9. This insures that there will be no leak between the piston and the pump casing when the piston is used for forcibly delivering fuel.

At the inner end of the pump casing is a chamber 13. Projecting laterally from the valve housing 3 is a member 14 to which a pipe may be connected leading to a source of fuel supply. Mounted in this member 14 is a valve seat 15 with which a check valve 16 makes contact. The valve is held against its seat by means of a spring 17. A port 18a connects the chamber 13 with the member 14 and the supply pipe. When the pump piston is withdrawn, fuel will be drawn from the supply past the check valve 16 into the chamber 13 and the pump casing. When the pump piston is forced inwardly, the check valve 16 will close.

As illustrated, there are two outlets through the valve housing for selectively distributing the fuel to the place where it is to be used. One of these outlets is through the laterally projecting member 18 to which a pipe may be connected, and the other is through the laterally projecting member 19 to which the pipe may be likewise connected. The valve housing is provided with a tapered seat in which is located a cone-shaped valve 21. The valve is pressed against the seat by means of a spring 22 which bears against an abutment member 23 at its outer end and against the valve at its inner end. This abutment member 23 may be secured in any suitable way to the valve housing. As shown, this abutment member is completely housed within the pump casing, and a cap plate 24 threaded on to the valve housing will serve to hold said abutment member in place.

The valve is provided with a port 25 located centrally thereof and connected to radial ports 26, 26 leading to the chamber 13 (see Fig. 3). The valve is also provided with a radial port 27. When the valve is positioned as shown in Figure

1, this radial port is connected to the outlet member 19. By turning the valve through an angle of ninety degrees, then this port 27 could be connected with the outlet member 18. Thus it is that setting the valve in a predetermined position enables the operator to selectively distribute the fuel to the place where it is desired to use the same. It will be understood that one outlet alone may be used, or three or more outlets may be used, and all that is necessary is to bring the radial port 27 into connection with the desired outlet for distributing the fuel selectively to one or more of a plurality of cylinders in a hydrocarbon engine, or to one or more hydrocarbon engines in a group.

In order to provide a means for readily turning the valve to different set positions and also to an off position where the port 27 is closed, the piston 4 is recessed at its inner end as indicated at 28. Mounted in this recess is a projecting stem or wrench 29 which may be connected to the valve for turning the same and which is disconnected from the valve during the operation of the piston for delivering a charge of fuel. This stem 29 is held rigidly attached to the piston by means of a pin 30 which passes through the piston and through the stem as clearly shown in Figures 2 and 3.

Means is provided for holding the piston against rotation, which means is so constructed that it may be released and the piston used when connected to the valve, for turning the valve. This means for preventing rotation of the piston at certain times comprises a key 31 which is located in a slot in the inner end of the piston. This key 31 passes through the stem 29 and the pin 30 passes through not only the piston and the stem, but also the key, and thus the key is rigidly attached to the piston. The pump casing is provided with a keyway 32 which extends from the outer end of the chamber 13 to the recess at the outer end receiving the packing for the piston. The key 31 has a projecting tongue 33 which when brought into register with the keyway 32 will enter said keyway and move along the same.

In Figure 5 of the drawing, two keyways 32 are shown, one which is associated with the outlet 18 and the other which is associated with the outlet 19. The inner end of the stem or wrench 29 is formed with an enlarged head 34. The head, for a distance up into the stem, has a slot 35. The valve has a projecting member 36 formed integral therewith, the outer end of which is rounded as indicated at 37. The corners 38 where the slot 35 merges into the outer face of the head 34 are also rounded. When the piston is moved to the inner end of its stroke, the projecting member 36 will enter this slot 35 in the stem or wrench attached to the piston, as clearly shown in Figures 1, 2 and 3 of the drawing. The piston may be moved inwardly so as to release the key from the keyway 32, and when said key is released from the keyway then the valve may be turned to a desired set position. As shown in Figures 1 and 5, the projecting tongue 33 of the key 31 is still in the keyway 32. A slightly further inward movement of the piston to the position shown in Figure 2 causes the key to pass out of the keyway so that the piston is released and the operator by use of the handle 5 may turn the piston and also turn the valve to a desired set position. Let us assume that the valve is turned so as to bring the key into register with the keyway associated with the outlet 18. This will connect the port 27 with the outlet 18, and when the piston is withdrawn, then the tongue of the key will pass into the keyway which is associated with this outlet 18.

It is desirable to turn the valve to an off position so that the radial port 27 is disconnected from either outlet, and this is accomplished in the following manner. The chamber 13 is of slightly larger diameter than the bore of the pump casing. This leaves a shoulder at the outer end of the chamber 13. The casing is provided with a recess in this shoulder as indicated at 39 in Figure 5 of the drawing. As indicated in Figure 4, there are two keyways and a single locking recess. These, of course, will be added to when additional outlets are used. If, therefore, the valve is turned so that the key enters this locking recess, the port 27 will then be positioned so that it is closed and not in register with any outlet.

Mounted on the stem 29 is a cup member 40. The cup member has an opening therethrough so as to provide a flange which engages the head 34. The cup member is also turned outward to form a flange 41. A spring 42 surrounds this cup member and at one end bears against the flange 41, while said spring at its other end bears against the end of the piston. This spring and the cup move with the piston in its reciprocations. The parts are so dimensioned that when the piston is moved inward, the cup will contact with the inner wall of the chamber 13. At this time, the stem or wrench 29 has passed down over the projecting member 36 on the valve so that they are in engagement. A further inward movement of the piston will compress the spring and move the key tongue out of the keyway. When the valve is turned to an off position and pressure is released on the piston, the spring will move the piston outward and cause the key tongue to seat in one of the recesses 39, and this positively locks the valve in this set position.

At the inner end of the port 25 is a valve seat 43 with which a ball check valve 44 is adapted to make contact. The valve is yieldingly pressed against the seat by a plunger 45. Said plunger is provided with a recess 46 in which is located a spring 47. This spring bears at its outer end against a diaphragm 48 and at its inner end against said plunger. There is a port 49 connecting the radial port 27 with the recess 46. There is also an opening 50 in the cap plate 24.

The check valve 44 is seated when the piston is withdrawn so that fuel is drawn by this outward movement of the piston from the supply. When the piston is forced inward, then this check valve 44 is unseated and the fuel passes through the outlet to the place where it is desired to use the same. Any suction pull on the outlet from the engine will, through the port 49, create a vacuum in the recess 46 on the inner side of the diaphragm 48. This diaphragm is flexible and when this vacuum pull occurs on the inner face thereof, the atmospheric pressure on the outer face of the diaphragm will increase the pressure of the spring against the plunger 45 and thus tightly seat the check valve 44 against the suction pull of the engine.

It will be noted that the projecting member on the valve extends well into the slot in the stem or wrench carried by the piston so that there is no chance of the piston being released for rotation at any time. Whenever the piston is rotated, it is connected up to the valve, and therefore, cannot get out of register with the

valve, because the valve, when the piston is disconnected therefrom for reciprocation, is left in a set position, and the piston cannot rotate during the reciprocation thereof for drawing in and dispensing the charge because the tongue on the holding key is in engagement with the keyway. It is also noted that the spring means which holds the piston in a set position is housed within the pump casing. Furthermore, the cup 40 is dimensioned so that when the piston is at the forward end of its stroke, it will contact with the inner wall of the chamber 13 before the stem contacts with said wall, or the face of the valve which is flush with said wall. This limits the inward movement of the piston without any possible chance of the piston or any part carried thereby striking and unseating the valve.

It is thought that the use of the pump will be clear from the description which has been given. Assuming that the valve is located in a set position and the operator desires to energize one or more of a plurality of cylinders, or a cylinder with one or more or a series of hydrocarbon engines, the handle of the energizing device is grasped by the operator, the piston moved inward until the locking tongue is moved out of engagement with the holding recess which holds the valve in off position, then the valve is turned to a selected position for dispensing the fuel. Suitable means is associated with the handle for indicating the setting of the valve relative to the point where the fuel is to be distributed. When the valve is properly set for distributing to a certain cylinder, then the tongue on the locking key is in alinement with the keyway and the piston can be fully withdrawn to draw a charge by the check valve 16 into the pump casing, and for then discharging the fuel on the instroke of the piston past the check valve 44 and to the desired place of use.

It is obvious that minor changes in the details of construction and arrangement of parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is—

1. An energizer for gas engines comprising a fuel pump having a casing, a reciprocating piston disposed within the casing, a valve housing associated with said pump casing for controlling the distribution of fuel by the pump, a distributing valve mounted in said valve housing, means whereby the piston when at the inner end of its stroke may be connected to said valve so that a rotating movement of the piston will shift the distributing valve to different set positions including a closed position, and yielding means disposed within said pump casing at the inner end of said piston for locking the piston against rotation while connected to the distributing valve so as to hold said valve in a set closed position.

2. An energizer for gas engines comprising a fuel pump having a casing, a reciprocating piston disposed within the casing, a valve housing associated with said pump casing for controlling the distribution of fuel by the pump, a distributing valve mounted in said valve housing, said piston having a projecting stem provided with a head having a slot extending diametrically across said head, and said valve having a projecting member adapted to engage said slot in the stem when the pump is at the inner end of its stroke so that a rotating movement of the piston will shift the distributing valve to different set positions including a closed position, and yielding means disposed within said pump casing at the inner end of said piston for locking the piston against rotation while connected to the distributing valve so as to hold said valve in a set closed position.

3. An energizer for gas engines comprising a fuel pump having a casing, a reciprocating piston disposed within the casing, a valve housing associated with said pump casing for controlling the distribution of fuel by the pump, a distributing valve mounted in said valve housing, said piston having a projecting stem provided with a head having a slot extending diametrically across said head, and said valve having a projecting member adapted to engage said slot in the stem when the pump is at the inner end of its stroke so that a rotating movement of the piston will shift the distributing valve to different set positions including an off position, said piston having a laterally projecting key tongue, and said casing having a keyway adapted to receive said tongue when the distributing valve is properly connected to an outlet, and for preventing rotation of the piston when disconnected from said valve, said casing having locking recesses adapted to receive said tongue and prevent rotation of the piston when the valve is turned to off position and while said piston is still in engagement with the valve.

4. An energizer for gas engines comprising a fuel pump having a casing, a reciprocating piston disposed within the casing, a valve housing associated with said pump casing for controlling the distribution of fuel by the pump, a distributing valve mounted in said valve housing, said piston having a projecting stem provided with a head having a slot extending diametrically across said head, and said valve having a projecting member adapted to engage said slot in the stem when the pump is at the inner end of its stroke so that a rotating movement of the piston will shift the distributing valve to different set positions including an off position, said piston having a laterally projecting key tongue, and said casing having a keyway adapted to receive said tongue when the distributing valve is properly connected to an outlet, and for preventing rotation of the piston when disconnected from said valve, said casing having locking recesses adapted to receive said tongue and prevent rotation of the piston when the valve is turned to off position and while said piston is still in engagement with the valve, a movable abutment member carried by the piston and a spring disposed between the end of the piston and the movable abutment member and movable therewith and operating to yieldingly force the locking tongue into the locking recess.

5. An energizer for gas engines comprising a fuel pump having a casing, a reciprocating piston disposed within the casing, a valve housing associated with said pump casing for controlling the distribution of fuel by the pump, a distributing valve mounted in said valve housing, said piston having a projecting stem provided with a head having a slot extending diametrically across said head, and said valve having a projecting member adapted to engage said slot in the stem when the pump is at the inner end of its stroke so that a rotating movement of the piston will shift the distributing valve to different set positions including an off position, said piston having a laterally projecting key tongue, and said

casing having a keyway adapted to receive said tongue when the distributing valve is properly connected to an outlet and for preventing rotation of the piston when disconnected from said valve, said casing having locking recesses adapted to receive said tongue and prevent rotation of the piston when the valve is turned to off position and while said piston is still in engagement with the valve, a cup-shaped abutment member carried by the inner end of the piston and having a limited movement thereon, a spring encircling said cup-shaped member between the piston head and the flange at the inner end of the cup, said cup being adapted to contact with the valve housing and compress the spring when the locking tongue is free from engagement with the keyway or a locking recess whereby said piston is urged outwardly and the tongue into a locking recess for holding the valve in an off position.

ARTHUR L. PARKER.