Nov. 28, 1933. E. G. OFELDT 1,936,853

PUMP

Filed May 23, 1930

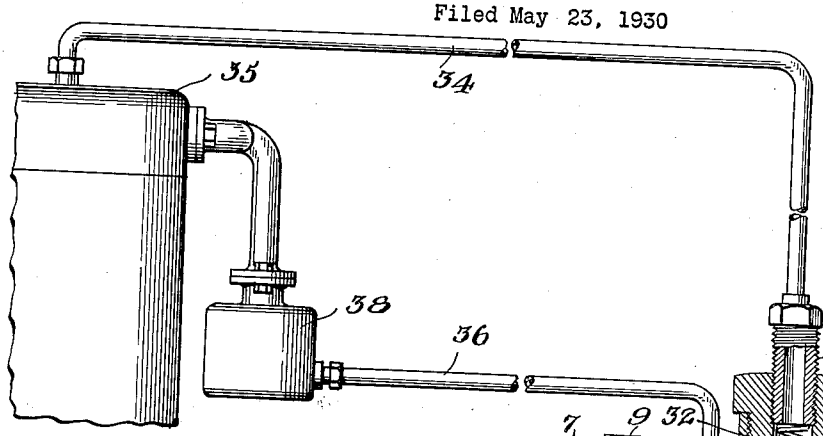


Fig. 1.

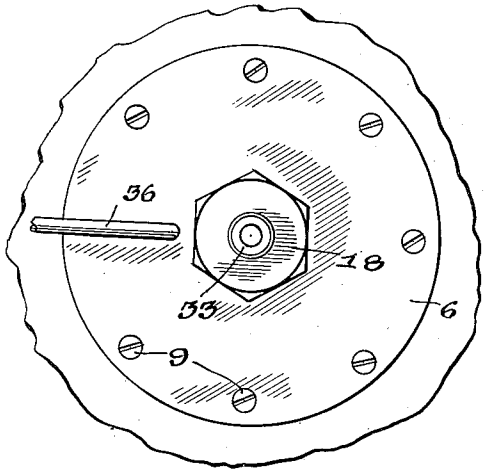


Fig. 2.

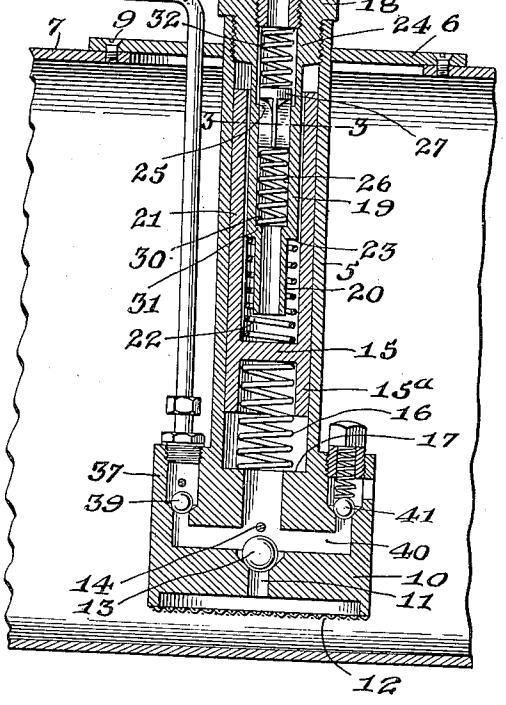


Fig. 4.

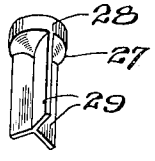
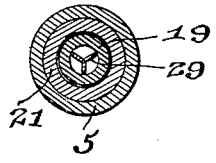


Fig. 3.



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Patented Nov. 28, 1933

1,936,853

UNITED STATES PATENT OFFICE

1,936,853

PUMP

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Application May 23, 1930. Serial No. 455,020

9 Claims. (Cl. 103—52)

This invention relates to improvements in pumps, and more especially to a novel pump to be actuated by the explosive impulses of an internal combustion engine for pumping fuel from a supply tank to the carburetor of an automotive engine.

One of the salient objects of the invention is to provide such a pump with an automatically operating reducing valve which will take care of fluctuations of pressure of the explosive impulses, so that the pump piston will operate in a uniform manner, regardless of the pressure transmitted to the pump by the engine.

Another object is to furnish a pump of this type which will be noiseless in operation.

A still further object is to provide a fuel pump including a barrel which is removably connected to the tank in such manner that the pump in its entirety may be readily removed from the tank for the purpose of cleaning, repairing or replacement of parts.

Another object is to provide the head of the pump with a removable cap so that the internal parts may be detached without removing the pump barrel from the tank.

Another object is to provide a pump of this kind, having an automatic safety check valve which, when the float chamber of the carburetor is full, will allow the pumped fuel to return to the supply tank or to the pump inlet.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawing, and more particularly pointed out in the appended claims.

In the drawing,

Fig. 1 is a vertical sectional view of the improved pump shown arranged in a fuel supply tank and connected with an engine cylinder and with the float chamber of the carburetor of the engine.

Fig. 2 is a top plan view of the pump.

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the pressure reducing valve.

Referring to the drawing, 5 indicates a pump barrel which is preferably provided at its upper end with an external flange 6. This barrel extends downwardly into a fuel supply tank 7, and in order that the barrel may be readily removed, the top of the tank is provided with a port 8 which is closed by the flange 6; the latter being secured to the tank by any suitable means, such as screws 9.

An enlarged foot 10 is provided at the lower end of the barrel, and is arranged in close proximity to the bottom of the tank, and the lower end of this foot has an intake port 11 that is protected by a screen 12. This port is controlled by a ball check valve 13, the upward movement of which is limited by a cross pin 14.

The fuel from the tank is drawn into the barrel past the check valve 13, by means of a piston 15 which reciprocates in the barrel. The piston has a depending skirt 15a, and a shock absorbing coil spring 16 has one of its ends seated within this skirt, and its other end bearing against an annular shoulder 17 of the pump barrel. Obviously, when the piston is forced downwardly, this spring absorbs the shock and acts to return the piston to its normal position.

A nipple 18 is threaded into the top of the barrel, and it extends downwardly as shown at 19 and 20, into a sleeve 21 which projects upwardly from the piston 15, and a coil spring 22 surrounds the portion 20 of the nipple and has its upper end abutting against an annular shoulder 23 of the nipple, and its lower end resting on the piston. Consequently, when the spring 16 acts to return the piston to its normal position, the spring 22 will receive the upward shock, and of course, both springs will tend to make the pump silent in operation.

The bore of the nipple is of largest diameter at its upper portion 24, and this portion is joined by an annular shoulder 25 to a reduced portion 26. The latter guides an automatically operated pressure reducing valve 27, which, as shown in Fig. 4, consists of a disk-shaped head 28 having radial vanes 29 on its under side, the side edges of which snugly engage the surface of the portion of the bore 26, so that the valve is guided in its reciprocation. A coil spring 30 is seated on an annular shoulder 31 in the nipple, and it yieldingly supports the valve at all times, and when this valve is depressed by the explosive impulses of the engine, the spring acts as a shock absorber and prevents damage to the piston 15. Another coil spring 32 is held against the valve by a threaded sleeve 33 which is screwed into the upper end of the nipple. The spring 32 functions as a shock absorber for the rebound of the valve. The valve is normally held in the position shown in Fig. 1 by the springs 30 and 32, and when the pressure exerted by the engine is low, the movement of this valve downwardly is hardly perceptible, but when the pressure is higher, the

valve allows the explosive gases to travel past the same, so as to reach the piston 15, but of course, when the pressure increases, the valve is moved further toward the shoulder 25, so that the passageway of the gases along the valve is restricted as the pressure increases. In other words, when the pressure of the operating gases are low, such gases can freely pass to the piston, but as the pressure increases, the passageway becomes restricted so that less gas can flow toward the piston.

For the purposes of the present invention, the nipple 33 is connected by a pipe 34 to the top of one of the cylinders 35 of the explosive engine with which the pump is combined, and the explosive impulses from this cylinder are transmitted by the pipe 34 into the pump for the purpose of reciprocating the piston 15.

Another conduit 36 connects the outlet valve port 37 of the pump to the float chamber of the carburetor 38 of the motor, so that the fluid pumped from the supply tank flows into the float chamber of the carburetor.

It is well known that such float chambers have float operated valves and, as the pump continually operates during the working of the motor, some means must be provided to cut off the flow of the fuel past the outlet valve 39 of the pump when the float chamber is full. For this purpose, I provide the foot of the pump with a drain port 40 controlled by a spring pressed valve 41, whereby when the float valve of the carburetor closes the conduit 36, the fuel pumped, instead of passing past the valve 39, will be discharged through the safety outlet port 40, back into the supply tank.

In operation, it will be understood that each explosion in one cylinder of the motor will cause explosive gases to travel through the ports 34, 33 and 18 to the piston 15 for depressing the latter and forcing a charge of liquid fuel from the same through the conduit 36 to the carburetor. Then, when the force of the explosion subsides, the spring 16, (being stronger than the spring 22), will return the piston to its normal position, and if the explosive force has been sufficient to depress the valve 28, the spring 30 will return that member to normal position.

The pumping will be continued in this way until the float chamber of the carburetor 38 is full, and after the float valve closes the conduit 36, the fuel pumped by the piston will be simply returned through the port 40 to the supply tank.

The pump has been shown as arranged within the tank, but of course, it can be interposed in a pipe line leading from the supply tank to the carburetor. In such case, a conduit would place the intake port 11 in communication with the supply tank, and the outlet of the port 40 can be placed in communication with the inlet 11 by a by-pass pipe, in a manner which will be obvious.

While I have disclosed what I now consider to be a preferred embodiment of the invention in such manner that the same may be readily understood by those skilled in the art, I am aware that changes may be made in the details disclosed, without departing from the spirit of the invention, as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. A fuel supply pump comprising a barrel having a valve controlled inlet and a valve controlled outlet, a piston arranged to reciprocate in the barrel, a conduit for conveying explosive gases into the barrel for actuating the piston, and means in the barrel responsive to the pressure of the gases and partially surrounded by a portion of the piston for restricting the passage of said gases to the piston as the pressure increases.

2. A fuel supply pump comprising a barrel having a valve controlled inlet and a valve controlled outlet, a piston arranged to reciprocate in the barrel, a conduit for conveying explosive gases into the barrel for actuating the piston, and means in the barrel responsive to the pressure of the gases and partially surrounded by a portion of the piston for restricting the passage of said gases to the piston as the pressure increases, said last mentioned means including a reciprocating valve coaxial with the piston.

3. A fuel supply pump comprising a barrel having a valve controlled inlet and a valve controlled outlet, a piston arranged to reciprocate in the barrel, a conduit for conveying explosive gases into the barrel for actuating the piston, and means in the barrel responsive to the pressure of the gases and partially surrounded by a portion of the piston for restricting the passage of said gases to the piston as the pressure increases, said last mentioned means including a reciprocating valve coaxial with the piston and springs arranged at opposite sides of the valve for normally holding the same in fully open position.

4. A fuel supply pump comprising a barrel, a reciprocating piston in the barrel, valve controlled ports for admitting fuel into the barrel and for discharging fuel from the barrel, said ports being arranged at one end of the piston, a conduit extending into the barrel and piston from the opposite end of the piston and adapted to convey explosion gases into the barrel for actuating the piston, and non-seating means in said conduit for automatically restricting the flow of the gases to the piston as the pressure of the gases flowing into the conduit increases.

5. A fuel supply pump comprising a barrel, a reciprocating piston in the barrel, valve controlled ports for admitting fuel into the barrel and for discharging fuel from the barrel, said ports being arranged at one end of the piston, a conduit extending into the barrel at the opposite end of the piston and adapted to convey explosion gases into the barrel for actuating the piston, and means in said conduit for automatically restricting the flow of the gases to the piston as the pressure of the gases flowing into the conduit increases, said last mentioned means comprising a non-seating reciprocating valve coaxial with the piston.

6. A fuel supply pump comprising a barrel, a reciprocating piston in the barrel, valve controlled ports for admitting fuel into the barrel and for discharging fuel from the barrel, said ports being arranged at one end of the piston, a conduit extending into the barrel at the opposite end of the piston and adapted to convey explosion gases into the barrel for actuating the piston, and means in said conduit for automatically restricting the flow of the gases to the piston as the pressure of the gases flowing into the conduit increases, said last mentioned means including a non-seating reciprocating valve, and shock absorbing springs in the barrel arranged at opposite sides of the valve and normally holding the same in fully open position.

7. A fuel supply pump comprising a barrel, a reciprocating piston in the barrel, valve controlled ports for admitting fuel into the barrel and for discharging fuel from the barrel, said ports be-

ing arranged at one side of the piston, a conduit extending into the barrel at the opposite side of the piston and adapted to convey explosion gases into the barrel for actuating the piston, and means in said conduit for automatically restricting the flow of the gases to the piston as the pressure of the gases flowing into the conduit increases, said last mentioned means including a differential bore for the conduit coaxial with the barrel, a valve slidably mounted in a smaller portion of said bore and adapted to restrict the flow of gases from the larger to the smaller portion of the bore, and springs arranged at opposite sides of the valve for normally holding the same yieldingly in fully open position.

8. A fuel supply pump comprising a barrel provided at one end with valve controlled inlet and outlet ports, a piston mounted for reciprocation in the barrel and provided with oppositely extending sleeves, a coil spring arranged in the barrel and extending into one of said sleeves for yieldingly resisting the movement of the piston in one direction, a nipple detachably connected to the opposite end of the barrel and extending into the other sleeve of the piston, a coil spring arranged in the last mentioned sleeve and bearing against the nipple and piston for resisting the movement of the latter in the opposite direction, said nipple having a differential bore, and a valve arranged in said bore and adapted to restrict the passage of gases through the latter in one direction as the pressure of said gases increases.

9. A fuel supply pump comprising a barrel provided at one end with valve controlled inlet and outlet ports, a piston mounted for reciprocation in the barrel and provided with oppositely extending sleeves, a coil spring arranged in the barrel and extending into one of said sleeves for yieldingly resisting the movement of the piston in one direction, a nipple detachably connected to the opposite end of the barrel and extending into the other sleeve of the piston, a coil spring arranged in the last mentioned sleeve and bearing against the nipple and piston for resisting the movement of the latter in the opposite direction, said nipple having a differential bore, a valve arranged in said bore and adapted to restrict the passage of gases through the latter in one direction as the pressure of said gases increases, and springs in the nipple at opposite sides of the last mentioned valve for yieldingly holding said valve in a certain position.

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