June 9, 1953 A. RAPPL 2,641,107

ACCESSORY SYSTEM

Filed April 20, 1948

Fig. 1.

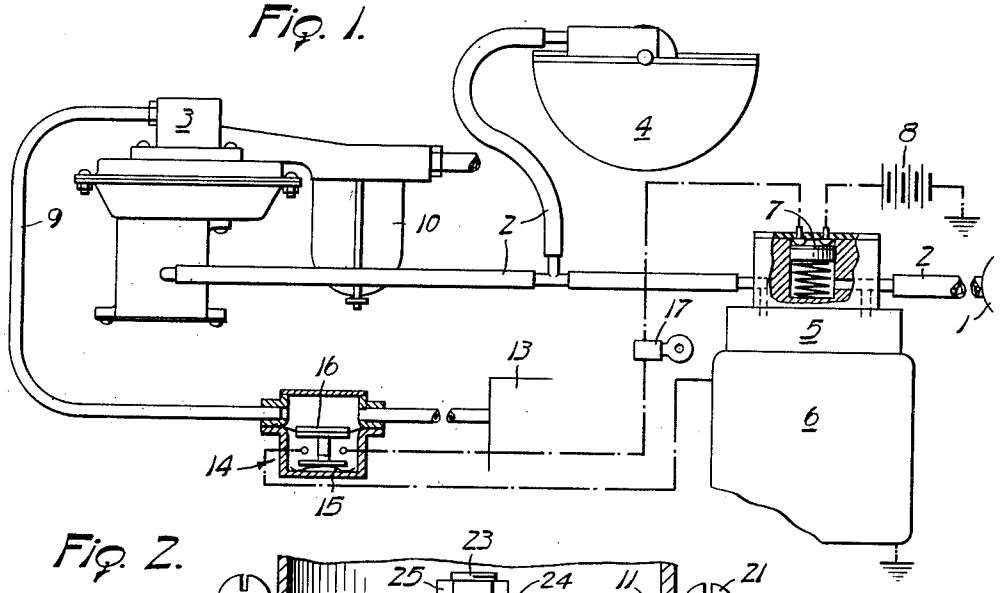


Fig. 2.

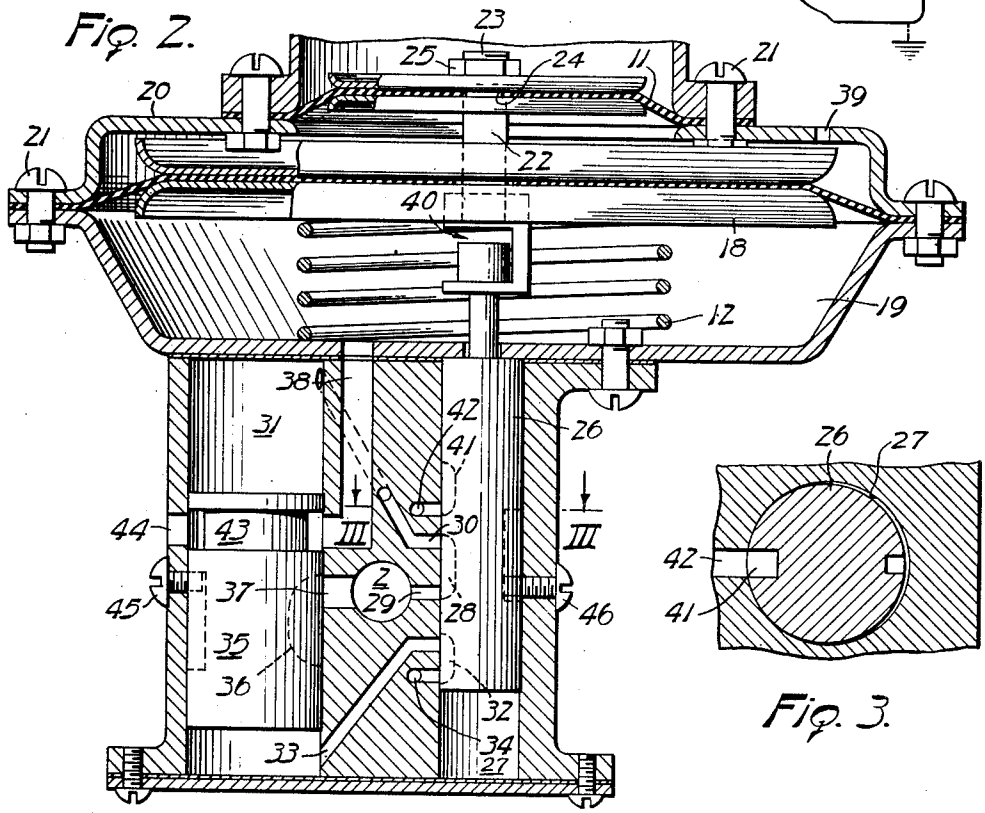


Fig. 3.

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Patented June 9, 1953

2,641,107

UNITED STATES PATENT OFFICE

2,641,107

ACCESSORY SYSTEM

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Application April 20, 1948, Serial No. 22,141

5 Claims. (Cl. 60—60)

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This invention relates to the automotive art and more especially to a fuel feeding system for internal combustion engines and to a motor for operating the same.

It has heretofore been proposed to utilize the manifold suction influence and to supplement this by a pump during intervals when the manifold supply became deficient. The pump was brought into function by a switch responsive to the manifold suction but since the manifold pressure influence is ever fluctuating it is apparent that the pump would unnecessarily start and stop at frequent intervals.

An object of the present invention is to provide a fuel feeding system which is more practical and satisfactory in performance. Further, the invention has for its object to make the system directly responsive to the fuel demand of the invention in such manner that the secondary source of pressure is precluded against unnecessary operation.

Again, the invention resides in a practical fluid motor drive which is readily adapted to a standard fuel pump for producing an efficient pump unit.

The invention further has for its object to provide an efficient pump unit and a valve therefore which are economical of manufacture, of durable construction, and one in which the valve is more readily insured a sealed fit upon its seat.

The foregoing and other objects will manifest themselves as this description progresses, reference being had to the accompanying drawing wherein

Fig. 1 is a diagrammatic layout of a fuel feeding system embodying the present invention;

Fig. 2 is a vertical sectional view through the pump thereof; and

Fig. 3 is a cross sectional view of the valve about on line III—III of Fig. 2.

Referring more particularly to the drawing, the numeral 1 designates the intake manifold of an automobile engine, 2 the suction line leading therefrom, 3 the usual fuel pump, 4 another accessory such as a windshield cleaner, and 5 a rotary pump which is driven by an electric motor 6. This pump may be generally of the design shown in Patent Number 2,520,650 through which the suction line 2 extends from both accessories 3 and 4 to the manifold for enabling the manifold influence to be operatively impressed upon the accessories when the pump is inoperative. A switch 7, inserted in the suction line, is connected in circuit with the electric motor 6 and a source of electrical energy 8 and is designed to open the motor circuit when the manifold suction is ample for accessory operation.

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The fuel pump is interposed in the fuel line 9 adjacent a sediment trap 10 and includes a piston or diaphragm 11 which is normally under an urge from spring 12 to displace fuel to the usual carburetor 13. A switch 14 in the motor circuit is normally closed by a spring 15 and is adapted to be opened by a diaphragm 16 in response to the pump pressure on the fuel. It will therefore be observed that whenever the vehicle engine is in operation the pressure supplementing pump 5 and its electric motor 6 are only energized when both the manifold suction and the fuel supply pressure are low or inadequate. Both pressure responsive switches must be in a circuit closing condition concurrently. The usual ignition key switch 17 will open the motor circuit when the engine is arrested, and when the ignition switch is again closed to restart the engine, the fuel pump will immediately function to supply an ample fuel flow providing conditions are favorable for such purpose.

In accordance with the present invention a novel fluid motor is provided to actuate the fuel displacing member 11, the same comprising a relatively larger piston or diaphragm 18 and a chamber 19, with automatic valve mechanism connected thereto for operatively applying the motivating fluid pressure. This fluid motor is designed for attachment to the usual fuel pump 3 by an adaptor housing section 20, which may be considered as a part of the motor chamber, and suitable fasteners 21. To complete the installation the motor piston 18 has a projecting rod 22 for coupling to the fuel displacing member 11, as by passing the threaded end 23 through an opening 24 in the fuel displacing member and fixing it there by a nut 25. This readily adapts the fluid motor for attachment to a standard pump. The spring 12 which determines the maximum pressure of the delivered fuel is conveniently incorporated in the fluid motor to serve the added function of returning the motor piston 18 to its elevated position shown.

The automatic valve mechanism is also controlled by this spring and comprises a pressure reversing valve 26 slidable back and forth in a chamber 27 between two operative positions. In one such position a recess 28 in the valve connects a suction supply port 29 in the chamber wall to one end of a passage 30 which communicates with one end of a second chamber 31, while a venting recess 32 in the valve serves to vent the opposite end of the second chamber to the atmosphere through a second passage 33 and an atmospheric port 34. A shuttle valve 35 slides within the second chamber 31 and has a recess 36.

With suction or subatmospheric pressure being supplied to the port 29 by the suction line 2, this arrangement of port connections will cause the resulting pressure differential in chamber 31 to shift the shuttle valve 35 to its upper position wherein its bridging recess 36 will connect the suction supply port 37 to the motor chamber port 38. With the upper side of the piston-like diaphragm 18 being open to the atmosphere through one or more holes 39 and the lower side exposed to the suction influence, a pressure differential will follow to depress the diaphragm against the tension of spring 12. As the diaphragm descends it will pull down the smaller diaphragm 11 to intake a charge of fuel. The pressure reversing valve 26, being connected to the diaphragm 18 by a play connection 40, will move to its lower or other operative position, wherein a second venting recess 41 connects the passage 30 to the second atmospheric port 42 and the suction supply port 29 is joined to the passage 33 by the recess 28. This arrangement of port connections will reverse the pressure differential upon the shuttle valve and move it to its lower position to block off the suction communication with the motor chamber 19 and open the latter to the atmosphere by reason of the passage 43 in the shuttle valve 35 coming to rest in registry with the chamber port 38 and an atmospheric port 44.

The operative positions for the shuttle valve and the pressure reversing valve may be determined by guide screws 45 and 46, respectively, operating between opposing shoulders on the valves. The shuttle valve may have a light frictional fit in the chamber 31.

The pressure reversing valve 26 is unique both in design and in operation, the same having its seat engaging face, in which the recesses 28, 32 and 41 are formed, constituting a part of a cylinder the radius of which is less than that of its similarly shaped chamber 27 with which it has tangential contact along the series of recesses. In other words, the cylindrical valve is slightly less in diameter than its cylindrical chamber and while providing a loose fit, it does not detract from its efficient performance since the pressure differential acts upon the valve to hold it firmly to the seat with a light seal. One of its chief advantages is the economy of manufacture. Both the valve and its chamber may be shaped truly cylindrical and being nearly of the same diameter any clearance between the edges of the recesses and the chamber wall will be infinitesimal and not detrimental to the proper functioning of the valve. This, in contrast to a flat valve and the fitting of the same to its flat face, is a much simpler procedure.

Since the manifold suction is present with more or less degree in the suction line 2, during motor vehicle operation, the windshield cleaner 4 or other accessory has a source of power independent of the electrically operated pump 5 regardless of the two pressure responsive switches 7 and 14.

The foregoing description has been given in detail but without thought of limitation since the inventive principles are capable of assuming other physical embodiments without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is

1. A fuel system for motor vehicles, comprising a fuel pump, pressure actuated means for operating the same, a suction supply line from the intake manifold of the vehicle engine to said means for supplying the actuating pressure, a suction supplementing pump in the line, an electric drive for the suction pump, and means responsive to the fuel pressure as delivered by the fuel pump and also responsive to the manifold suction influence in the line for energizing the electric drive.

2. A fuel system for motor vehicles, comprising a fuel pump, pressure actuated means for operating the same, a suction supply line from the intake manifold of the vehicle engine to said means for supplying the actuating pressure, a suction supplementing pump in the line, an electric drive for the suction pump, a normally closed switch in circuit with the drive and responsive to the fuel pressure from the fuel pump for opening the circuit, and a second normally closed switch arranged in the circuit in series with the first switch and responsive to the manifold influence in the line for opening the circuit.

3. A fuel system for motor vehicles, comprising a fuel pump, pressure actuated means for operating the same, a suction supply line from the intake manifold of the vehicle engine to said means for supplying the actuating pressure, a suction supplementing pump in the line, an electric drive for the suction pump, a normally closed switch in circuit with the drive and responsive to the fuel pressure from the fuel pump for opening the circuit, a second normally closed switch arranged in the circuit in series with the first switch and responsive to the manifold influence in the line for opening the circuit, and manual means for opening the circuit.

4. An accessory system for motor vehicles, comprising an accessory motor, such as a windshield cleaner, a fuel pump, pressure actuated means for operating the fuel pump, a suction supply line from the intake manifold of the vehicle engine to said means for supplying the actuating pressure, a suction supplementing pump in the line, an electric drive for the suction pump, means responsive to the fuel pressure as delivered by the fuel pump and also responsive to the manifold suction influence in the line for energizing the electric drive, and means connecting the accessory to the suction supply line for operation by the manifold suction influence independently of the suction supplementing pump.

5. A fuel system for motor vehicles, comprising a fuel pump, pressure actuated means for operating the same, electric means operable to supply the actuating pressure to the first means, means responsive to the pressure on the fuel delivered by the pump for energizing the electric means, in combination with the ignition circuit of the motor vehicle engine in such manner that the circuit for said electric means will be open when the ignition switch is open.

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