J. G. VINCENT.

PUMP FOR MOTOR VEHICLES.

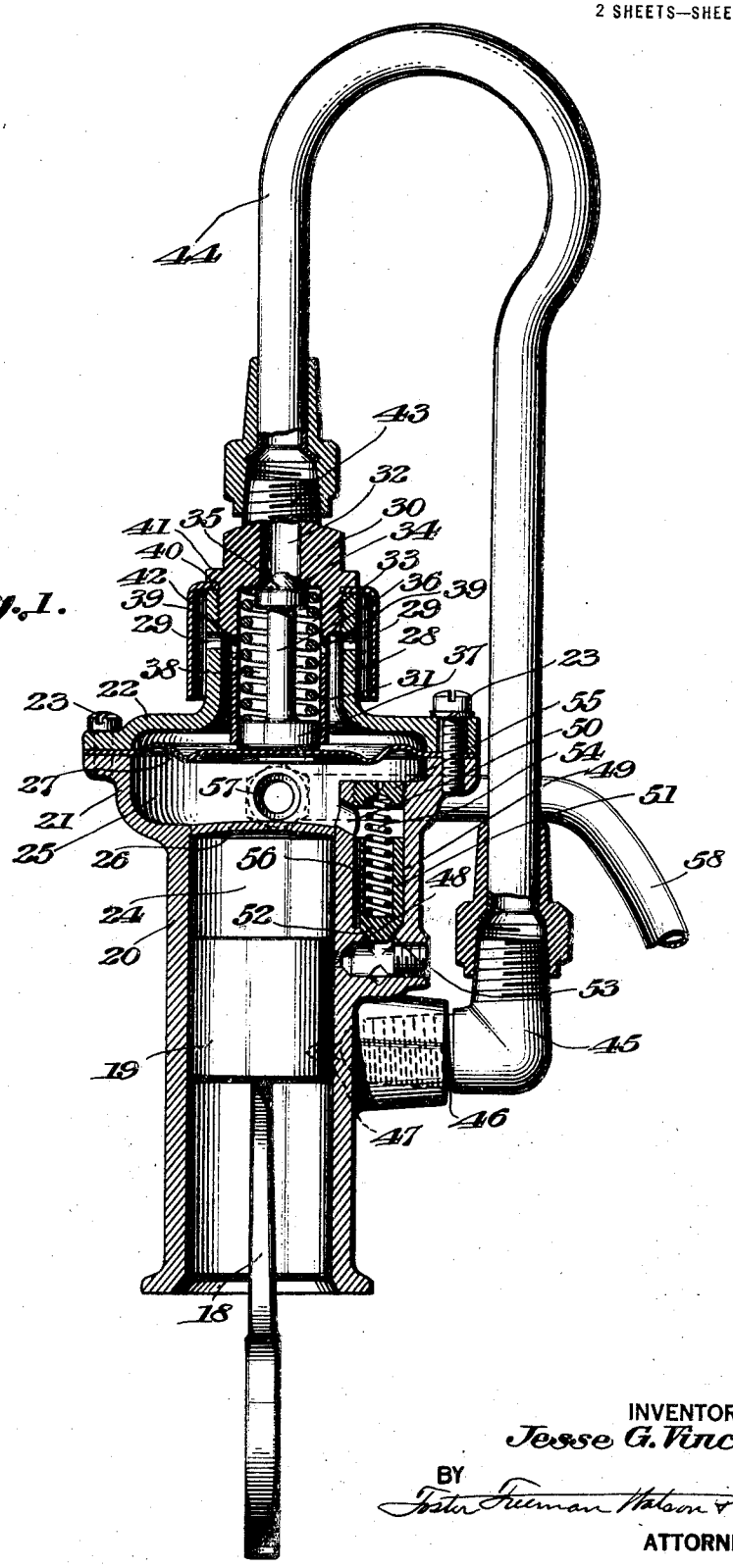
APPLICATION FILED SEPT. 7, 1917.

1,345,902.

Patented July 6, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



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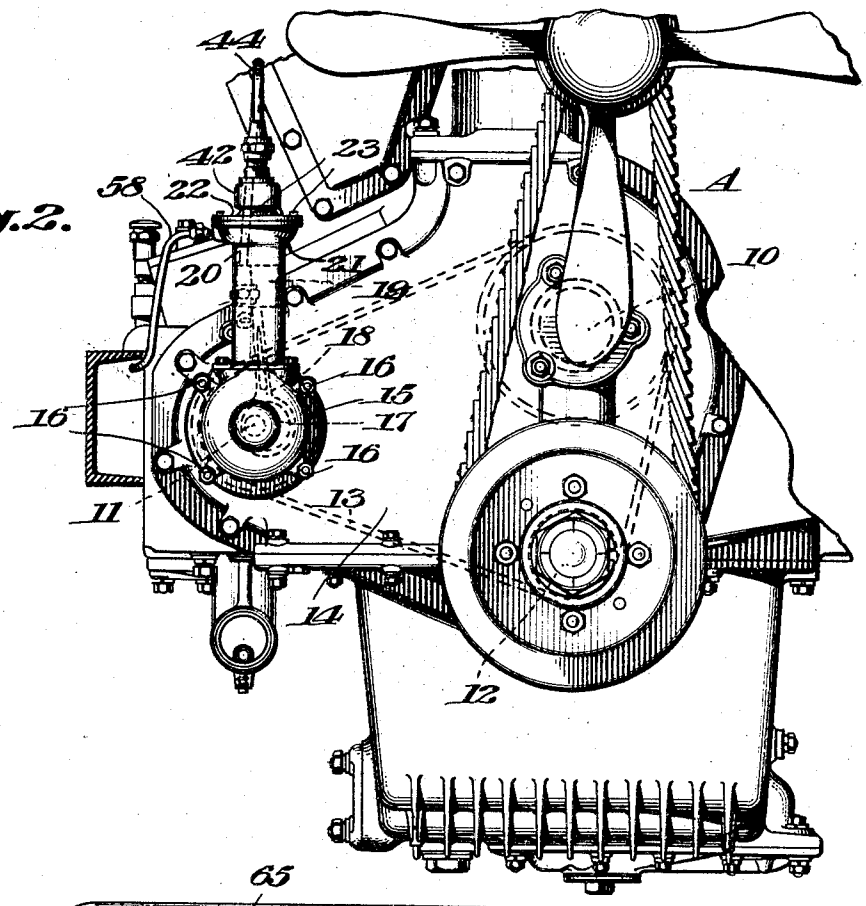
2 SHEETS—SHEET 2.

Fig. 2.



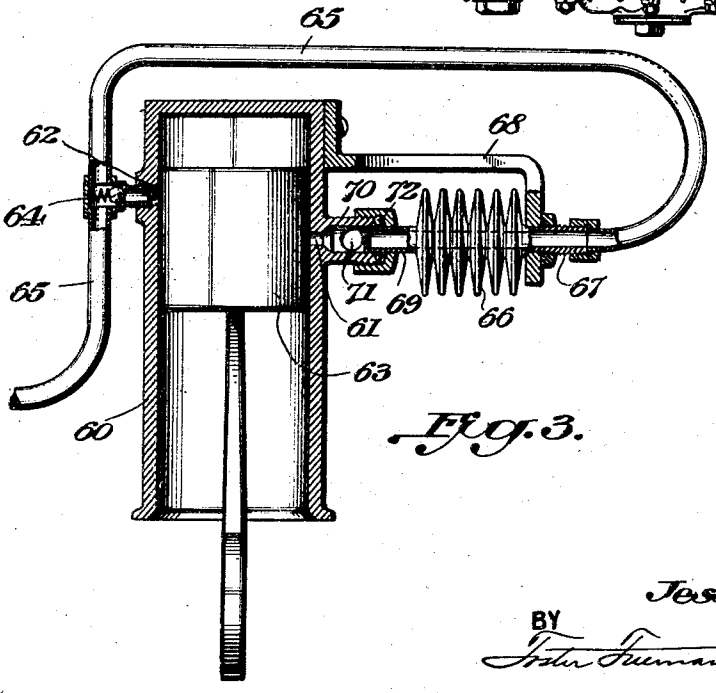


Fig. 3.

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JESSE G. VINCENT, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

PUMP FOR MOTOR-VEHICLES.

1,345,902. Specification of Letters Patent. Patented July 6, 1920.

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To all whom it may concern:

Be it known that I, JESSE G. VINCENT, a citizen of the United States, and residing at Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Pumps for Motor-Vehicles, of which the following is a specification.

This invention relates to motor vehicles, and more particularly to a pump for producing and automatically maintaining a constant pressure in the fuel tank.

In motor vehicles employing the pressure system for supplying fuel to the vehicle engine, it is of primary importance that the pressure be maintained constant, otherwise the engine does not operate uniformly nor at the maximum efficiency. According to this invention a power driven pump is employed to produce the pressure in the fuel tank.

The principal objects of the invention are to provide a pump which is simple, dependable, substantially fool-proof, and which becomes inoperative when the pressure in the tank reaches a predetermined amount. To this end, the invention comprises a fluid pump and means operated by the pressure of the discharged fluid for controlling the action thereof. Another feature of the invention consists in detachably mounting the pump at the front end of the motor where it is very accessible and can be driven by means of a short and direct drive from the crank shaft. Other objects and features of novelty will be apparent from the description taken in connection with the drawings, in which:—

Figure 1 is a sectional elevation through a pump constructed in accordance with the present invention;

Fig. 2 is a front elevation of a portion of a hydro-carbon motor showing the location of the pump; and

Fig. 3 is a sectional elevation of another form of the invention.

Referring to the drawings, and more particularly Fig. 2, a hydrocarbon motor A is shown having the cam shaft 10 and generator shaft 11 driven from the crank shaft 12 in any desired manner, as by means of a chain 13. This drive is located at the front of the motor and is inclosed in a casing having the removable front cover 14. The pump for producing pressure in the fuel tank has its crank or eccentric casing 15 detachably secured to the cover 14 as by means of the cap screws 16. The end of the generator shaft 11 extends into this casing and is formed with an eccentric 17 which operates an eccentric rod 18 connected to the piston 19 of the pump.

Referring to Fig. 1, it will be observed that the pump comprises a cylinder 20 having an enlarged upper end 21 to which is secured the cylinder head 22 as by means of the cap screws 23. The cylinder is divided into a piston chamber 24 and a discharge chamber 25 by a partition 26 which is expanded and sweated into the cylinder. A diaphragm 27 is clamped between the end of the cylinder and the head 22 and forms a yieldable wall for the discharge chamber 25. The cylinder head is formed with a projecting neck or hollow boss 28 having the apertures 29 through the wall thereof. The upper end of this neck is internally threaded and has a plug 30 screwed into the same, the plug having a downwardly extending tubular portion 31 and being formed with a bore 32 and a counterbore 33. The end of the bore where it joins the counterbore is beveled to form a seat 34 for a valve 35. A spindle 36 extends downwardly from the valve and has an enlarged end 37 which is in contact with the diaphragm 27. The enlarged end 37 fits in the tubular portion 31 and thereby guides the valve in its movements toward and from its seat. A spring 38 is arranged in the said tubular portion and acts to normally hold the valve 35 open. As shown, the wall of the tubular portion 31 is formed with apertures 39 so that air may pass in through the apertures 29 and 39 to the valve. A thimble has an inwardly extending flange 40 which is clamped between the upper end of the neck 28 and the flange 41 formed on the plug 30. This thimble has a downwardly extending skirt 42 which is spaced from and concentric with the neck 28. The arrangement is such that air supplied to the pump must pass under the lower end of this skirt before it can enter the apertures 29 in the neck. Thus foreign matter is excluded from air entering by the valve 35.

The upper end of the plug 30 is formed with a nipple 43 which has one end of a pipe 44 screwed thereon, the other end of the pipe being connected to an elbow 45, which in turn, by means of a nipple 46 communicates

with the inlet opening 47 formed in the wall of the cylinder 20. Above this inlet opening is a discharge opening 48 also formed in the wall of the cylinder, and this discharge opening has communication with the discharge chamber 25 by means of a bore 49 formed in the wall of the cylinder and the duct 50. For the purpose of preventing back-flow of compressed fluid from the discharge chamber, a check valve is arranged in the bore 49. This valve comprises a plunger 51 having a conical end 52 forced against the seat 53 by means of a spring 54. One end of the spring acts against the plunger and the other end against a plug 55 screwed into the end of the bore 49. The plunger 51 is formed with a longitudinally extending slot 56 which when the valve is forced from its seat forms a conduit for the discharged compressed fluid. The discharge chamber 25 has an outlet 57 connected with a pipe 58 which carries the compressed fluid to the fuel tank.

In the operation of the pump the fluid compressed by the upward movement of the piston 19 is discharged through the opening 48 by the check valve 52 into the discharge chamber 25. As previously stated, the valve 35 which controls the supply of fluid to the pump is normally held open by the spring 38. As the pressure builds up in the discharge chamber 25 the diaphragm or yielding wall 27 is deflected upwardly, as viewed in Fig. 1, which movement actuates the valve 35 in a closing direction, thus cutting off the supply of fluid to the inlet of the pump. Under these conditions the pump continues to operate merely compressing and allowing to expand the volume of air which has been caught in the piston chamber 24. When the pressure in the fuel tank, or discharge chamber 25, decreases, the valve 35 will automatically open and permit fluid to be supplied to the pump.

In the form of the invention illustrated in Fig. 3, the cylinder 60 has its wall formed with an inlet opening 61 and a discharge opening 62, and has a piston 63 slidingly mounted therein. Fluid compressed in the cylinder is discharged at 62 by a check valve 64 into a discharge pipe 65. This pipe is connected with a discharge chamber formed by a casing 66 having yieldable walls arranged like an accordion bellows. One end of this casing has a nipple 67 which is connected with the discharge pipe 65 and is mounted in a bracket 68 secured to the cylinder 60. The other end has a projecting tubular portion 69 which is seated for sliding movement in the bore of a boss 70 communicating with inlet opening 61. This boss is formed with a lateral aperture 71 and has a stuffing box 72 surrounding the tube 69. The arrangement of these parts is such that fluid pressure within the casing 66 causes the tube 69 to move toward the left, as viewed in Fig. 3, thereby closing the aperture 71 and cutting off the supply of fluid to the inlet 61 of the pump. The tube 69, therefore, constitutes a valve which corresponds with the valve 35 of the other form of the invention.

In the operation of the pump illustrated by Fig. 3, the fluid compressed in the cylinder is discharged through the opening 62 by the check valve 64 into the discharge pipe 65, and is thus conducted to the discharge chamber formed within the yieldable walls of the casing 66. As the pressure in the chamber builds up, the valve 69 moves to the left, as viewed in Fig. 3, to thereby cut off the supply of fluid to the pump. When the pressure of the fluid in the fuel tank or discharge pipe 65 falls below the required amount, then the casing 66 contracts, thereby opening the valve 69 and permitting fluid to be supplied to the pump.

Although two embodiments of the invention have been described specifically, it is understood that the details may be varied within the scope of the following claims, without departing from the spirit of the invention.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:—

1. In combination, a cylinder, a piston slidably mounted therein, a partition above the piston dividing the cylinder into a piston chamber and a discharge chamber, an inlet opening and a discharge opening formed through the side of the cylinder, the discharge opening being nearer the discharge end of the cylinder than the inlet opening, a discharge conduit connecting the discharge opening and the discharge chamber, an inlet valve controlling the admission of fluid to said inlet, and pressure responsive means associated with said discharge chamber for governing said valve.

2. In combination, a cylinder, a piston slidably mounted therein, a partition above the piston dividing the cylinder into a piston chamber and a discharge chamber, an inlet opening and a discharge opening formed through the side of the cylinder, the discharge opening being nearer the discharge end of the cylinder than the inlet opening, a discharge conduit connecting the discharge opening and the discharge chamber, an inlet valve controlling the admission of fluid to said inlet, and means for governing the action of said valve in accordance with the pressure in the discharge chamber including a diaphragm forming one wall of the discharge chamber.

3. In combination, a cylinder having inlet and discharge openings, a removable head and a partition dividing the cylinder into a piston and a discharge chamber, a dia-

phragm clamped to the cylinder by said head and forming one wall of said discharge chamber, said discharge chamber connected to said discharge opening, and means governed by the movement of said diaphragm for controlling the admission of fluid through said inlet opening.

4. In combination, a cylinder having inlet and discharge openings, a removable head and a partition dividing the cylinder into a piston and a discharge chamber, a diaphragm clamped to the cylinder by said head and forming one wall of said discharge chamber, said discharge chamber connected to said discharge opening, the cylinder head carrying a normally open valve for controlling the admission of fluid through said inlet opening arranged to be closed by expansion of said diaphragm.

5. A fluid pump including in combination a cylinder having an inlet opening and a discharge opening, the discharge opening being between the inlet opening and the head end of the cylinder, a single acting piston slidable in said cylinder, a single valve means controlling the admission of fluid through said inlet, said valve means being normally open, and means operated by the pressure of the fluid in the discharge acting to move said valve means in its closing direction.

6. A fluid pump including in combination a cylinder having an inlet opening and a discharge opening, the discharge opening being between the inlet opening and the head end of the cylinder, a single acting piston slidable in said cylinder, a discharge chamber at the head end of the cylinder having a yieldable wall, said cylinder having a passage in its wall connecting said discharge opening and chamber, a spring closed valve controlling said passage, a conduit for conveying fluid from adjacent the cylinder head to said inlet, a single valve controlling the admission of fluid to said conduit, and said yieldable wall acting on said valve in opposition to a spring normally holding the valve open.

7. A fluid pump including in combination, a cylinder having an inlet opening in its wall and a discharge opening located between the inlet opening and the cylinder head, a discharge chamber at the head end of the cylinder in communication with the discharge opening, said chamber having a diaphragm forming one wall thereof, a valve casing carried by the cylinder adjacent said diaphram, said casing being in communication with said inlet and the atmosphere, a valve in said casing controlling the admission of air to the inlet, and a spring holding said valve open, said diaphragm being operative on the valve to move it in a closing direction as the pressure in said chamber increases.

In testimony whereof I affix my signature.

JESSE G. VINCENT.