Nov. 18, 1924. 1,515,981

L. H. WHEELER

PUMPING DEVICE FOR FUEL FEEDING TO INTERNAL COMBUSTION ENGINES

Filed June 2, 1922

Fig. 1.

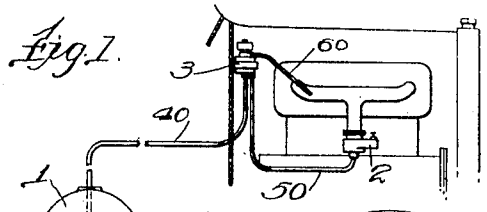


Fig. 2.

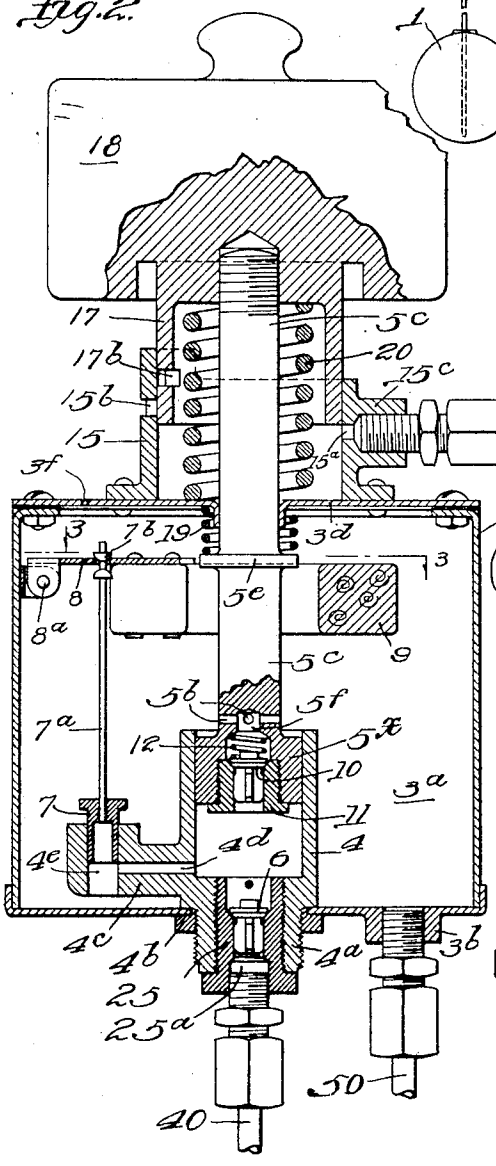


Fig. 3.

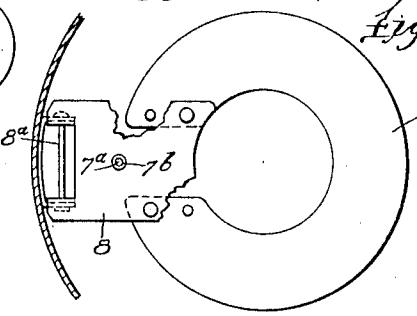
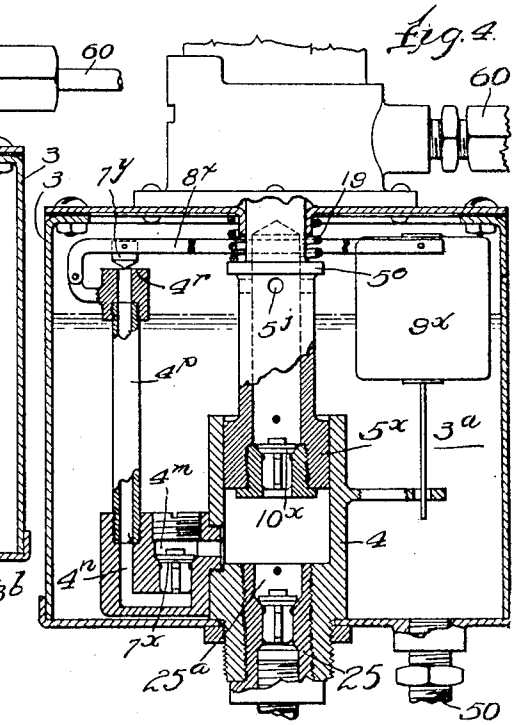


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PUMPING DEVICE FOR FUEL FEEDING TO INTERNAL-COMBUSTION ENGINES.

Application filed June 2, 1922. Serial No. 565,469.

To all whom it may concern:

Be it known that I, LEONARD H. WHEELER, a citizen of the United States, residing in the city of Chicago, in the county of Cook and the State of Illinois, have invented certain new and useful Improvements in Pumping Devices for Fuel Feeding to Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of a device for pumping the liquid fuel from a low level supply source to a higher level for supplying the carbureter of internal combustion engines by gravity. It consists in the elements and features of construction shown and described, as indicated in the claims.

In the drawings:—

Figure 1 is a diagrammatic view showing the relative position on an automobile of the main low level supply tank, the carbureter and the device embodying this invention.

Figure 2 is a vertical axial section of the receptacle and parts associated therewith containing the characteristic features of the invention.

Figure 3 is a section at the line, 3—3, on Figure 2.

Figure 4 is an axial section of a modification of the pump and connections in the elevated receptacle.

In the drawings, 1 is the low level fuel supply tank of an automobile; 2 is the carbureter; 3 is the receptacle from which the carbureter is supplied by gravity; 40 is a pipe connecting the low level tank with the receptacle, 3; 50 is a pipe connecting the receptacle, 3, with the carbureter. 60 is a pipe leading to the pumping device on the upper part of the receptacle, 3, from a source of vacuum which may be the intake manifold of the engine, as indicated by pipe, 60, extended to said manifold. The receptacle, 3, comprises the fuel chamber, 3^a, and a pump therein consisting of the pump cylinder, 4, and piston, 5^x, reciprocating in said cylinder. The cylinder, 4, terminates at its lower end in a threaded nipple, 4^a, which protrudes through the bottom of the receptacle, 3, the exterior thread securing a nut, 4^b, by which the pump is clamped fixedly to the bottom of the receptacle. The interior thread serves for screwing into said nipple an intake valve body, 15, whose intake passage, 25^a, is controlled by an upwardly opening and downwardly seating check valve, 6. The axial passage through said intake fitting, 25, is counterbored and interiorly threaded at its lower end for connection of the pipe, 40, from the low level supply tank, 1. The bottom of the receptacle, 3, is also provided with an interiorly threaded boss, 3^b, at which there is connected the pipe, 50, leading to the carbureter. Within the receptacle, 3, the pump cylinder, 4, has a laterally extending branch, 4^c, into which there is formed a passage, 4^d, leading from the lower end of the cylinder chamber, and a vertical cross passage, 4^e, with which said passage, 4^d, communicates, said vertical passage serving as the slideway seat for a sliding or piston valve, 7, which may reciprocate in the vertical passage, 4^e, for opening or closing the passage, 4^d, by opening or closing communication of the pump cylinder with the chamber, 3^a, of the receptacle. The valve, 7, has its stem for operating the rod, 7^a, extending upward from the valve to a connection, 7^b, with the lever, 8, pivoted at 8^a, on the wall of the receptacle, 3, and carrying at its free end a float and weight, 9, preferably as a matter of convenience and compactness of construction is annular in form and of suitable material, as cork, adapted to operate as a float or weight according to the condition of liquid in the chamber, the central opening therein serving to accommodate the stem of the piston, 5^x. The pump piston, 5^x, has an axial passage, 5^f, leading from its lower end upward and connecting with the cross passage, 5^b, in the stem above the piston head. In said passage, 5^f, there is located an upwardly-opening and downwardly-seating check valve, 10, whose seat is afforded by the bushing, 11, screwed into the enlarged and threaded lower end of the passage, 5^f, a light spring, 12, being inserted above the valve to insure its seating. The stem, 5^c, of the piston extends out through the top plate, 3^d, of the receptacle, 3, and axially through a pumping device which comprises a cylinder, 15, secured upon the top plate, 3^d, of the receptacle, 3, and a hollow piston member, 17, mounted for reciprocating in said cylinder and extended at its upper end to form a weight, 18, into which the upper

end of the stem, 5^e, of the piston, 5^x, is screwed, having extended axially through both the chambers of the cylinder, 15, and the axial cavity of the piston, 17, in which there is provided, surrounding said piston stem, a spring, 20, reacting between the top plate, 3^d, and the upper end of the cavity of the piston, 17, for upholding the piston, 17, and its weight, 18, as seen in Figure 2. Within the recptacle, 3,—that is, below the top plate, 3^d, thereof, the piston stem, 5^e, has an annular flange, 5^e, which stops the lower end of a spring, 19, coiled around the piston and reacting at its upper end against the under side of the cap plate, 3^d, for cushioning the up-stroke of the piston in the operation of the device hereinafter described. The cylinder, 15, has two apertures, 15^a and 15^b, the aperture, 15^a, leads through an exteriorly protruding boss, 15^c, interiorly threaded for connecting the pipe, 60, which leads to the source of suction as above described. The aperture, 15^b, is positioned so as to be closed by the piston, 17, at the position of said piston at which the lower end thereof is above the aperture, 15^a, so that said last mentioned aperture is open for the suction. Upon the descent of the piston, 17, so far as to close the aperture, 15^a, an aperture, 17^b, of the piston, registers with the aperture, 15^b, for admission of atmospheric pressure to relieve the partial vacuum which may be caused in the chamber of the said cylinder and piston, 15 and 17, by the previously operated suction admitted through the aperture, 15^a.

The intended operation of the structure above described is that upon vertical jolting of the vehicle upon which it is mounted, the piston, 15, of the pump contained in the receptacle, 3, weighted by the parts which are carried by the stem and chiefly by the weight, 18, at the upper end of the hollow piston, 17, is driven downward in the cylinder, 4, and is withdrawn upward under the reaction of the spring, 20, thus performing several reciprocations before coming to rest after the first jolt, and repeating the operation as often as successive jolts may occur. In this reciprocation of the piston, the pump acts in the ordinary manner of a suction pump, pumping up the liquid from the low tank, 1, past the check valve, 6, and discharging it up past the check valve, 10, in the piston, 5^x, out through the cross-port, 5^b, into the chamber, 3^a, of the receptacle, 3, it being understood that initially,—that is, starting with the chamber, 3^a, empty, the weight, float, 9, operates for holding the valve, 7, down at position for closing the passage, 4^b, so that there is no discharge of liquid from the pump cylinder to that passage. The liquid thus delivered into the chamber, 3^a, is free to pass to the carbureter by gravity through the pipe, 50, by virtue of the said receptacle, 3, having atmosphere inlet ports, 3^f in the cap plate. Assuming that the pumping resulting from the jolt is sufficient to more than supply the carbureter, the chamber, 3^a, will ultimately become filled up to a height at which the float, 9, will be lifted and will open the valve, 7. And thereupon, successive jolting operation, causing the reciprocation of the piston, 5^x, will merely serve to pass the liquid in and out through the passage, 4^d, or perhaps partly out past the check valve, 10, and into the passage, 4^d, in either case without lifting any more liquid from the low receptacle past the check valve, 6. But when the requirements of the carbureter have drawn upon the supply in the receptacle so as to permit the float, 9, to be again lowered and close the valve, 7, the pumping from the low tank, 1, into the receptacle, 3, will be resumed.

The operation above described will ordinarily serve to maintain a reliable supply of fuel in the receptacle, 3, for meeting the requirements of the carbureter, so long as the vehicle is in travel and subject to the ordinary jolts of travel. But when the vehicle is at rest and the engine is running idle, no jolting may be presumed to occur and there would soon be an exhaustion of the supply of fuel in the receptacle, 3, and no more would be lifted from the main low tank. To meet this condition and adapt the device for its purpose under all conditions, idling and where there is travel of the car, is the purpose of the upper cylinder and piston, 15 and 17, with its suction and atmosphere connections. According to this construction, it will be observed that at the normal position,—that is, at rest, with the pump piston in the receptacle, 3, at highest position, and the piston, 17, at its highest position in the cylinder, 15, the port, 15^a, is open to the suction; and it will be understood that the partial vacuum resulting from such suction will cause the piston, 17, to descend, compressing the spring, 20, until the ports, 15^b and 17^b, become registered, whereupon the instant access of atmosphere will defeat the suction and the spring, 20, will react for immediately thrusting the piston members upward; whereupon the port, 15^a, will be again uncovered, suction will operate to repeat the inthrust of the pistons into their respective cylinders until the ports, 15^b and 17^b, are again registered to relieve the suction; and this partial vacuum will continue as long as there is suction enough to produce the depression and inthrust of the piston member. By this means the pump in the receptacle, 3, will be operated, just as it is expected to be operated by jolting of the vehicle, and the liquid fuel will thereby be pumped from the main low tank into the receptacle, 3, until the float, 9, is lifted to open the valve, 7, and defeat the

further pumping in of the liquid while the pumping operation will nevertheless continue under the suction, as in the course of the running of the vehicle on the road which will continue from the jolting under like conditions of the low receptacle.

In the form shown in Figure 4 the passage leading from the lower end of the pump cylinder, 4, is formed with a vertically extending portion, 4^m, at the upper end of which there is seated a check valve, 7^x; and beyond said check valve the passage turns upwardly as seen at 4^n, and there is connected thereto an upwardly-extending pipe, 4^p, which extends to a point above the high liquid level of the receptacle where it is provided with a valve seat, 4^r, at which there is a downwardly seating valve, 7^y, carried by the lever arm, 8^x of the float, 9^x. The specific purpose of this modification is to cause at the high period of liquid level when the operation of the pump is rendered inoperative for lifting liquid and merely cause a circulation within the receptacle, said circulation shall consist of air drawn from the upper part of the receptacle and passed out again into said upper part; and for the last stated purpose of this modification the passage in the piston, 5^x, through which delivery is made to the chamber, 3^a, of the receptacle, is extended up in said piston stem to a point above the high liquid level where the transverse passages, 5^j, are formed for delivery into the receptacle chamber. The operation of the device is in all respects the same as that above described in respect to the form shown in Figure 2, except that as stated, the circulation is a circulation of air instead of liquid, during the idling of the pump while the receptacle is filled to the high liquid level.

I claim:—

1. A fuel pumping device for supplying internal combustion engines on a road vehicle, comprising in combination with a fuel receptacle, a pumping means therein consisting of a pump cylinder and a piston therein apertured for delivery of liquid thereto; intake valves at the bottom of the cylinder and at the inner end of the piston respectively, the pump cylinder having a vent and inlet above the intake valve thereof; valve means for controlling said vent and inlet and means operated by change of liquid level in the receptacle for opening the vent at a predetermined high level thereof.

2. In the construction defined in claim 1, foregoing, the pump piston being weighted and spring-supported at retracted position in the pump cylinder.

3. A construction for the purpose indicated comprising a pumping device comprising a receptacle into which the fuel is to be lifted and a reciprocating pump therein discharging thereinto, and means for governing the operation of the pump by the level of liquid in the receptacle; a cylinder and piston therein above the high liquid level of receptacle, said piston being operatively connected with the reciprocating member of the pump, the cylinder having connection with a source of suction for inthrust of the piston; a spring for retracting the piston and automatic means for relieving the vacuum produced by the suction at a predetermined limit of inthrust, and closing such relief at a predetermined limit of retraction.

4. In the construction defined in claim 3, foregoing, the means for relieving and terminating the relief on the vacuum caused by the suction, consisting of a port in the cylinder and a port in the piston positioned for registering at a predetermined position of inthrust for admitting atmospheric pressure at said position, and adapted to be out of registration upon a predetermined withdrawal of the inthrust member.

5. In the construction defined in claim 1, foregoing, a conduit extending up from the pump cylinder vent port, said conduit having an inlet from the receptacle chamber at a higher point than said port; a valve for closing said high level inlet seating in the direction of inflow from the conduit from the receptacle, and a float operatively connected for opening the valve at a predetermined high level of liquid in the receptacle.

6. In the construction defined in claim 1, foregoing, a conduit extending up from the pump cylinder vent port having an inlet above the high liquid level of the receptacle; a check valve in said conduit seating against the inflow thereto from the pump cylinder; a check valve at the inlet from the receptacle which valve is normally seated against inflow, adapted to be opened by discharge flow from the conduit into the receptacle, and a float operatively connected with said last mentioned valve for opening it and holding it open upon the rise of the float with the liquid to the predetermined high liquid level.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 29th day of May, 1922.

LEONARD H. WHEELER.