

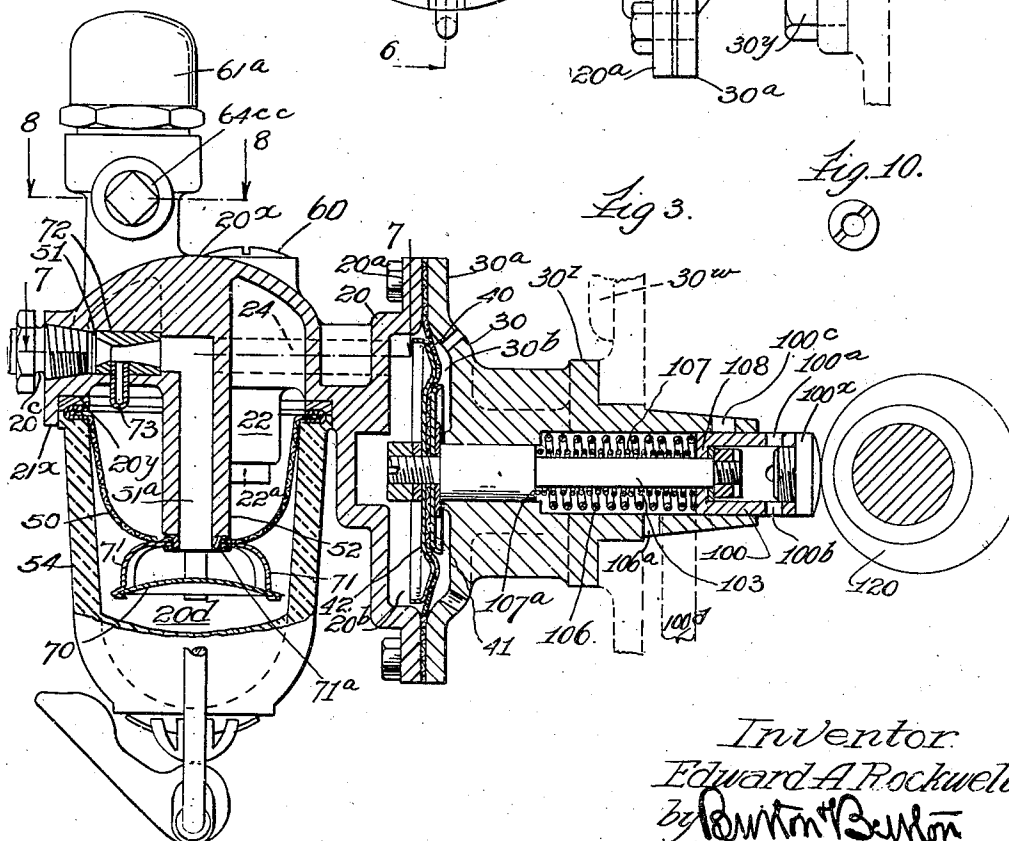
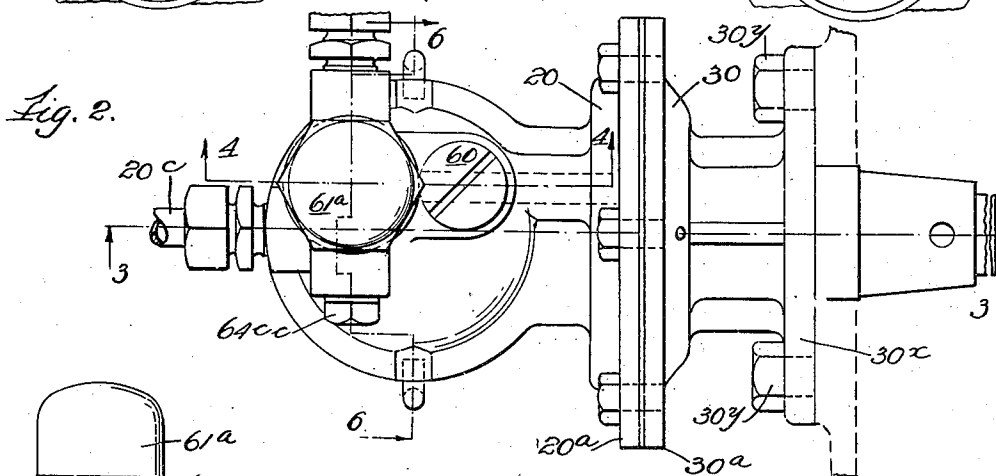
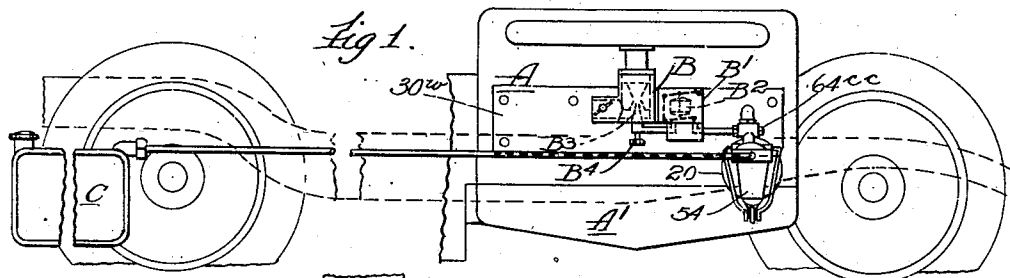
Feb. 13, 1934.

E. A. ROCKWELL
FUEL FEEDING DEVICE

1,946,590

Filed April 19, 1929

2 Sheets-Sheet 1



Witness my hand.

Inventor
Edward A. Rockwell
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Feb. 13, 1934.

E. A. ROCKWELL

1,946,590

FUEL FEEDING DEVICE

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2 Sheets-Sheet 2

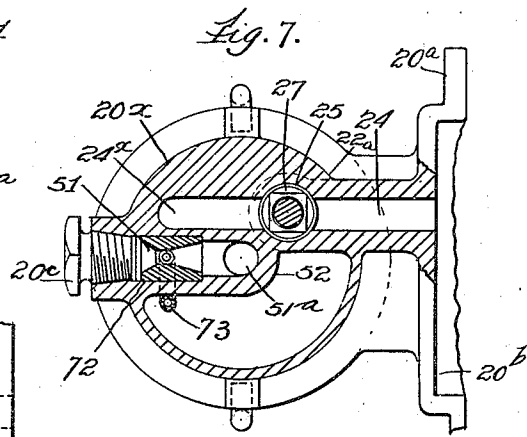
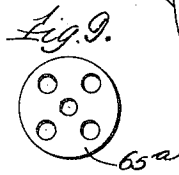
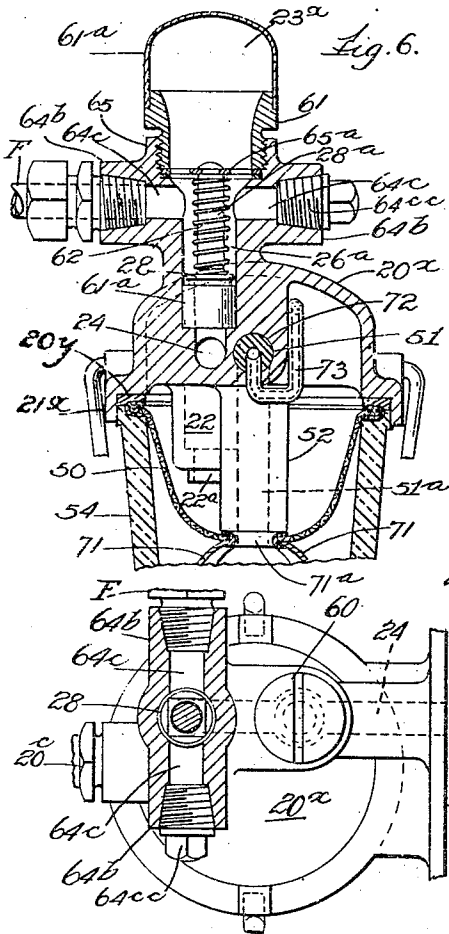
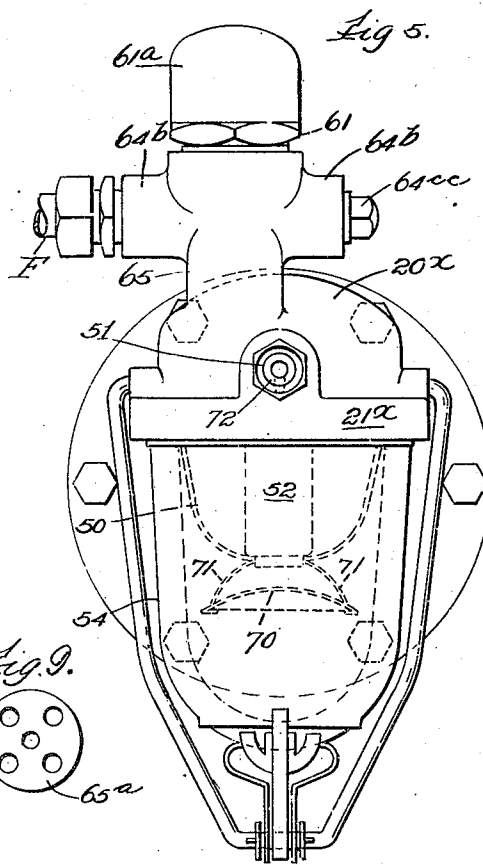
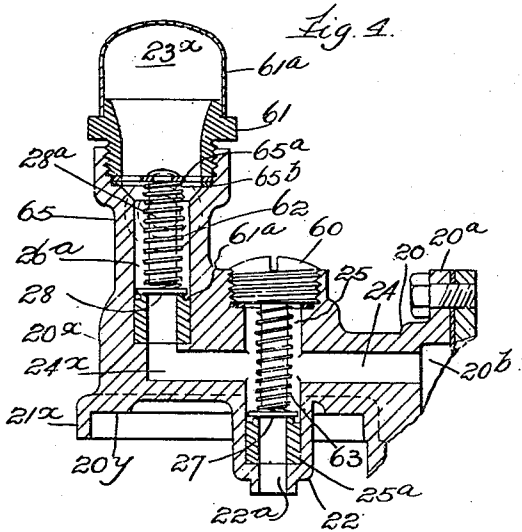


Fig. 8.

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UNITED STATES PATENT OFFICE

1,946,590

FUEL FEEDING DEVICE

Edward A. Rockwell, Long Island City, N. Y.

Application April 19, 1929. Serial No. 356,330

18 Claims. (Cl. 103—150)

A specific purpose of this invention is to provide an improved construction in a pumping device for supplying fuel to an internal combustion engine on a motor vehicle arranged to be operated by a shaft of the engine and adapted to deliver the fuel to the reserve chamber of the carbureter under substantially uniform pressure throughout the range of varying running conditions, including change in fuel lift due to reduced quantity of fuel in the main fuel tank, and due to changes of grade on the road in travel, and having pumping capacity relatively to the size of the device greater than that of somewhat similar types of pumping devices which have heretofore been on the market or disclosed to the automobile-using public. The invention in the broader aspects of certain features is designed as an improvement in liquid-pumping apparatus other than for supplying fuel to an engine. The invention 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 for showing the location of the pumping device relatively to the engine and the vehicle, including a main fuel supply tank carried in the customary position at the rear of the vehicle.

Figure 2 is a top plan view of the pumping device embodying the invention in one of its forms.

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

Figure 4 is a section at the line 4—4 on Figure 2.

Figure 5 is a side elevation of the structure shown in Figure 2.

Figure 6 is a detail section at the line 6—6 on Figure 2.

Figure 7 is a detail section at the line 7—7 on Figure 3.

Figure 8 is a detail section at the line 8—8 on Figure 3.

Figure 9 is a plan view of the perforated valve-supporting disc located below the dome 61; and

Figure 10 is an end elevation of the screw-threaded member within the hollow plunger, 100.

In the drawings A represents the engine body of which the crank case is indicated at A¹. B is the carbureter of familiar form, having a governed level chamber, B¹, in which the level is governed by float, B², and which is connected for fuel discharge to the nozzle, B³, controlled by a needle valve, B⁴. C is the main fuel supply tank located at the rear of the vehicle.

The pumping device comprises main housing members, 20 and 30, having faces defined by mated angular flanges, 20^a and 30^a, encompass-

ing recesses, 20^b and 30^b, in said faces respectively, for clamping between said flanges a flexible substantially vertical diaphragm, 40, which becomes the movable wall of a pumping chamber formed by the recess, 20^b, in the casing member, 20. The member, 30, has a flange, 30^x for attaching the same by screws, 30^y to the crank case of an internal combustion engine, cut-out portions, 30^z being provided in the flange, 30^x to allow room for the removable valve-tappet cover, 30^w, of the engine. Said casing member, 20, as shown, comprises a part 20^x integrally projecting from the side opposite the diaphragm, 40, at an upper segmental portion thereof, which has at its under side in a horizontal plane an annular flange, 21^x, within which there is secured an upwardly open cup-shaped filter member, 50, located beside the diaphragm, 40, in the angle between the same and said horizontal plane, the casing portion, 20^x, having an annular seat, 20^y, at which said cup-shaped member, 50, makes liquid-tight junction by any convenient securing and sealing means.

The passage, 24, leads from the pumping chamber, 20^b, horizontally into the part, 20^x, communicating therein with the upwardly extending passage, 25, which leads through a downwardly projecting boss, 22, which projects and opens at its lower end within the inlet filter member, 50, whereby it becomes the fuel inlet passage with respect to the pumping chamber.

The fuel supply, it may be understood, is derived from the fuel source shown at C, Figure 1, which, under conditions of low supply in the tank or up-grade travel, may require substantial lift of the fuel by suction which the pumping device is adapted to afford. The fuel supply pipe being connected at the entrance to the inlet passage, 51, leads horizontally in from the pipe connection shown at 20^c, of the casing member, 20^x, and downwardly at 51^a, through the downwardly projecting boss, 52, which extends axially through the filter member, 50, for discharge exteriorly thereof in the sediment and fuel accumulating or reserve chamber, 20^d, formed by a glass bowl, 54, which is clamped and secured in a familiar manner against the upper marginal flange of the filter member for holding the latter fluid-tight to the casing, as described. The fuel thus reaches the fuel intake passage, 25, only after passing through the filter member.

It will be observed that the arrangement of the inflow and outflow connections of the accumulating chamber, 20^d, both being at a level substantially below the top of the chamber, makes

the upper part of the chamber operate as an air trap in which a condition of partial vacuum or sub-atmospheric pressure may result from the intake stroke of the pump when the liquid source is at a lower level than the pump intake, and in which there may arise a condition of pressure when from any cause the liquid source is elevated above the level of the pump intake. In the latter case the pump may exhaust the fuel from chamber 20^d at a sufficient rate to cause a partial vacuum in the trapping space by drawing fuel out faster than it is delivered into the chamber 20^d from the fuel tank. The utility or advantage to be taken of this feature will be hereinafter referred to.

In the passage, 25, there is placed a bushing, 25^a, which forms a valve seat for an upwardly opening check valve, 27, which is normally seated by gravity, but is further provided with a coil spring, 63, stopped at its upper end by a screw plug, 60, and at its lower end reacting on the valve, 27, above said horizontal plane, for insuring the normal seating of said valve.

The passage, 24, at the end of its horizontal extent has a part, 24^x, which communicates with an upwardly extending duct, 26^a, formed in a boss, 65, at the upper end of which there is formed a pressure trapping chamber, 23^x, by means of a hollow plug, 61, with an upwardly flared chamber therein, screwed at its lower portion into the upper end of the boss, 65, in which the upper end of the duct, 26^a, is counterbored with an upper flared end for enlarging the capacity of the trap chamber, said chamber comprising the cavity of a sheet metal stamping cap, 61^a, which closes air-tight the upper end of the hollow plug, 61.

The hollow plug, 61, serves for clamping between its lower end and the shoulder formed by counter-boring the boss, 65, a gasket, 65^b, and a spider, 65^a, which affords support for the stem, 28^a, which limits opening movement of an upwardly opening check valve, 28, also above said horizontal plane, constituting the discharge valve of the pump, for which a seat is provided by a bushing, 61^a, tight-fitted in the lower end portion of the duct, 26^a, said check valve, 28, being normally seated by gravity upon the upper end of said bushing, but being further provided with a spring, 62, coiled about the guide stem and stop member, 28^a, supported at its upper end by the spider, 65^a, and at its lower end reacting on the valve, 28, for ensuring its proper seating.

The spider 65^a is a perforated plate which has a highly important function in assisting in the separation or combing out of the vapors from the liquid fuel and permitting the collection of the vapors in the trapping chamber 23^a. As previously stated, the passage above the outlet valve expands to receive the pressure on the fuel and permit the escape of air and vapor. The liquid fuel is drawn off through the lateral passage which the bubbles of vapor tend to continue moving upwardly and pass through the perforations in the baffling or separating plate into the space thereabove which continues the expansion by the tapering walls of the plug 61 until the vapors finally collect in the trapping space. The perforations also permit draining of condensed liquid fuel from the trapping chamber back into the fuel line. If it were not for the provision of the baffling plate, the liquid fuel would quickly fill the air dome by removal of the trapped vapor.

The boss, 65, has at opposite sides transversely projecting bosses, 64^b, 64^b, bored as seen at 64^c, immediately above the seat of the check valve, 28, for communicating with the passage, 26^a, thereby affording by either of said bosses pipe connection for the discharge pipe, F, leading to the carbureter, the other being closed by a plug, 64^c.

It will be understood that the pressure trapped in the chamber, 23^x, operates for instant response to the demands of the engine when started after a period of idleness. Also, at all times during the running of the engine, this trapped pressure tends to equalize the pressure of the fuel on the carbureter, preventing that pressure from pulsating with the back and forth strokes of the pump diaphragm.

A defect in the operation of pressure-trapping chambers of the character of the trap chamber above described is liable to be experienced by reason of the gradual absorption by the liquid of the air or vapor trapped in the trap chamber for affording by its reaction from compression the pressure for maintaining the feeding of the liquid onward to the carbureter, so that gradually, and eventually completely, the trap chamber is liable to become occupied with liquid, displacing the air and vapor.

In the present construction this defect is measurably obviated by means which will now be described, operating to cause the liquid taken into and discharged from the pumping chamber to be, to a considerable extent, aerated or charged with vapor, which tends to accumulate in the pressure trapping chamber and force out the bottom of that chamber the liquid which may have occupied the same upon the previous absorption of the air or vapor initially trapped in the chamber.

The means for this purpose comprises a liquid-dispersing disk, 70, suspended by bracket arms, 71, and a crimped ferrule, 71^a, from the lower end of the hollow boss, 52, and positioned at a short distance below the discharge end of the vertical passage, 51^a, so that the liquid delivered through said passage and discharging downwardly from the lower end thereof, impinging upon this dispersing disk, is spread and sprayed from the margin thereof, thereby preventing, by the cross current, the accumulation of lint, etc. on the screen, 50, while preventing the stirring up of dirt, etc. in the bottom of the chamber, 20^d, and in the spraying and spreading process is quite thoroughly intermixed with air and vapor which initially occupies the reserve chamber, so that the liquid which eventually fills the chamber to the intake lower end of the passage in the boss, 22, leading to the inlet check valve, 27, is very considerably aerated or vapor-charged, or both aerated and vaporized, and in this condition passes the check valve, 27, when it is drawn into the pump chamber in the intake stroke of the diaphragm, and when it is discharged from that chamber in the feeding stroke and passes the discharge check valve, 28. And when the liquid has passed the last mentioned check valve, the air and vapor escaping from the liquid occupies the trap chamber for the purpose and with the effect above described.

For increasing the aeration or vapor-charging of the liquid upon its delivery into the reserve chamber and for other purposes, there is provided in the horizontal portion, 51, of the intake passage from the supply pipe connection, 20^c, a Venturi sleeve, 72, having a vent inlet approximately

at the Venturi constriction, which, as illustrated, is provided by a U-tube member, 73, which serves incidentally for pinning the Venturi sleeve fast in the passage in which it is located,—said pipe member being inserted through the lower side of said horizontal passage, 51, and into the Venturi sleeve as mentioned, and constituting thereby an inlet for air or vapor to be drawn from the fuel reserve chamber at a point substantially above the level of the intake of the duct, 22^a, in the boss, 22, leading to the inlet check valve, 27. The opening from the tube, 73, being only in the bottom of the venturi, 72, secures the maximum mixing effect of vapor and liquid.

The operation of this venturi may be readily understood to be, that, upon the inflow of liquid from the source occurring upon the intake stroke of the diaphragm, the lowering of pressure at the venturi constriction causes an inflow of air or vapor from the upper part of the reserve chamber operating to aerate the inflowing liquid which is a little later discharged as described against the dispersing disk, 70, for further aeration or vaporizing, and intermixing the air and vapor throughout the liquid, so that it will be carried with the liquid in the discharge from the pumping chamber and be available for separating from the liquid when turning to enter the pipe, F, at the bottom entrance of the trapping chamber.

Independently of the venturi it may be understood that the air inlet into the passage, 51, afforded by the duct, 73, tends to aerate the liquid flowing through the passage, 51, the venturi serving, however, to accentuate this action.

This venturi performs the additional service of producing or tending to produce or increase a condition of partial vacuum in the upper part of the reserve chamber by the withdrawal of the air therefrom for aerating the inflowing liquid as described; and this condition of partial vacuum operates with the tendency to maintain the continued inflow of the liquid for a short period after the intake stroke of the diaphragm is completed, thus appreciably prolonging the inflow.

Upon consideration of this structure it may be understood that the sprayed and thereby aerated liquid discharged in the accumulating chamber, being compelled to pass through the filter screen, in that process will be still further finely subdivided and more intimately mixed with so much of the air as passes the screen, and that a portion of the air will be strained out of the liquid and left behind in the chamber outside the screen and will be trapped in the upper part of the chamber above the level of the intake of the duct, 22^a, leading to the inlet controlling valve, 27.

This thorough breaking up of the liquid and the intermixing of the air therewith which has thus been effected, tends to insure the air being carried with the liquid past the outlet controlling valve, 28, and to the entrance of the pressure trapping chamber as described.

The Venturi vent serves an additional purpose of venting the siphon consisting of the fuel connection from 20° to the fuel source, and the fuel passage from said connection, 20°, to the pumping chamber, said siphon tending to cause the evacuation of the passages when the engine stops running if there is any leakage past the valve, 27. The venting of this siphon at the crest thereof, which is the point at which the venturi is located, prevents the withdrawal of the liquid from that point onward to the pumping cham-

ber, including the fuel reserve accumulating chamber.

The dispersion of the liquid at its discharge from the passage, 51^a, after the chamber is occupied with liquid to the depth of the entrance to the duct, 22^a, operates to agitate the liquid content of the chamber, causing it to be in a constant state of ebullition splashing up against the outside of the filter strainer, with the effect of keeping the strainer washed clean of the solid impurities strained out of the liquid, particularly such impurities as fine particles of lint or other fibrous material which would be liable to eventually clog the strainer to an extent seriously impeding the passage of liquid through it.

The aeration of the incoming liquid effected both by the expedient of dispersing or spraying the liquid at its discharge from the passage, 51^a, and also by the expedient consisting of the venturi vented at its construction for air intake at that point, serves an additional purpose. The aerated liquid becomes considerably heated during the running of the engine during its movement through the passage including the fuel chamber, from its entrance at 20° to its discharge at 64°; and when the engine stops, the heated air and vapor being condensed as the structure becomes cooled, produces or increases a partial vacuum in the passages anterior to the discharge valve, 28; and this condition of vacuum operates for causing inflow of fuel from the source precisely as such inflow is caused by the intake stroke of the pump producing condition of partial vacuum; so that even though there may be tendency to back-flow of the fuel by siphon action by reason of the leakage of the valve, 27, this tendency will be fully or largely offset by the development of partial vacuum due to the condensation of the air and vapor; and the accumulating and reserve chamber will become almost completely filled with liquid during the intervals when the engine is not running, so that the carbureter will be supplied instantly upon the first stroke of the engine when it starts, without the delay which would otherwise occur while the fuel is being lifted from the fuel source to the pump.

Attention is called to applicant's co-pending application, Serial No. 266,598, filed April 2, 1928, showing and specifically claiming a special manner of providing a communication from the vapor trapping space to the inlet fuel passage. However, it is to be understood that the broad features of this improvement are to be covered by claims in this application since the functional operation is particularly important when associated with a vapor collecting and pressure chamber, which was not disclosed in the earlier-filed application above-referred to.

The mechanism for operating the pump diaphragm is arranged to cause the diaphragm to be yieldingly actuated both for its intake and for its discharge stroke, this being effected by providing the diaphragm with a two-membered stem, the two members being telescoped with each other with provision for lost motion in their relative movements, one of said stem members being positively secured to the diaphragm, and the other being positively engaged for actuation, in one direction by an engine-driven cam. A spring coiled about one of the telescoped stems reacts between the diaphragm-attached stem,—and thereby between the diaphragm,—and the positively actuated stem member for transmitting yieldingly to the diaphragm the positive actuation

of said positively actuated member; and a second spring also coiled about the same telescoped stem member reacts between the positively actuated member and the fixed stop on the casing for yieldingly retracting the positively actuated stem member in the inactive phase of the one-way actuating cam. In the structure shown, the telescoped stem members are slidably mounted in an extension of the casing formed protruding into the crank case of the engine served, for exposure of the end of the positively actuated stem member which protrudes from said extension to the actuation of a cam on the engine shaft from which the power for the movement described is derived.

Referring to the drawings:—

The diaphragm, 40, clamped and held as already described, at its outer circumferential margin between the casing flanges, 20^a and 30^a, is clamped and held inflexible at a central area between rigid disks, 41 and 42, hereinafter referred to as diaphragm form-controlling elements, which serve also for securing the diaphragm at its center to the inner telescoped stem member, 103, against a shoulder on a reduced screw-threaded inner end of the stem which is elongated and provided with a slot for a screw driver so that the stem can be held while a nut on this end is tightened in place. This screw-driver slot also enables the stem, 103, to be held while a round spanner-operated-nut on the other reduced end in the plunger, 100, is tightened in place, after which this reduced end is staked in over said round nut.

The outer and inner telescoped stem members, engaged respectively by the actuating cam, 120, and with the diaphragm, 40, are shown at 100 and 103. The member, 100, has pressed therein a hardened wear button, 100^x. The member, 100, has, also, oil discharging vents, 100^a and 100^b, and is oiled by an oil accumulating recess, 100^c.

The spring which reacts for giving the diaphragm its feeding stroke is seen at 107, coiled about the reduced outer end portion of the inner telescoped stem member, the spring being stopped at its inner end on the shoulder, 107^a, resulting from the reduction in diameter of the outer end portion of said stem member, and reacting at its outer end upon the intumed flange, 108, at the head or inner end of the outer telescoped stem member, which head constitutes also the stop for the outer end of the spring, 106, seated at its other end on a shoulder in the casing, which reacts for retracting said outer telescoped stem member through the range of the lost motion between the two telescoping stem members indicated at 100^d, and at the limit thereof for giving the diaphragm its intake stroke. The chamber containing the springs, 106 and 107, and the member, 100, also has an oil drainage vent, 106^a.

The diaphragm is strengthened and supported by a pair of disk members 41 and 42 which are so formed as to take up the slack in the diaphragm at any position of its stroke. The construction is highly important in insuring maximum efficiency in delivery and is disclosed more in detail in my co-pending application Serial No. 328,133 filed December 24, 1928.

It will be understood that the present improvements principally reside in the means employed for trapping, separating and producing vapor to maintain the efficiency of the outlet dome and improve the operation of the fuel-receiving filter chamber.

I claim:—

1. A liquid feeding means comprising a liquid supply passageway having a Venturi tube therein, an inlet chamber into which the same discharges, having a vapor-trapping space at the top thereof and a single passageway leading from said vapor-trapping space to said Venturi tube in the liquid supply passageway, and an outlet for the intermingled liquid and vapor located below said vapor-trapping space.

2. A liquid feeding means comprising a liquid supply passageway, an inlet chamber into which it discharges, an outlet from said chamber, a screen located between the inlet and outlet in said inlet chamber, a deflector for producing a current of the liquid across a portion of the face of the screen, said inlet chamber having a vapor-trapping space above the outlet, and means to produce a frothing effect to more effectively scrub the strainer.

3. A liquid feeding means comprising a liquid supply passageway, an inlet chamber into which it discharges, an outlet from said chamber, a screen located between the inlet and outlet in said inlet chamber, a deflector for producing a current of the liquid across a portion of the face of the screen, said inlet chamber having a vapor-trapping space above the outlet, and means to produce a frothing effect to more effectively scrub the strainer, comprising a communication between said space and the liquid supply passageway.

4. A liquid feeding means comprising a liquid supply passageway, an inlet chamber into which the same discharges, an outlet from said chamber, an impulser connected to said outlet, an inlet valve for said impulser, a spring pressed outlet valve for controlling the discharge from said impulser, a detachable dome for the accumulation of vapor over the liquid which has passed through the outlet valve, and a disk for supporting the spring of the outlet valve, adapted to be held in place by said dome, said disk having perforations and being located in an enlarged chamber for the passage of the liquid through said perforations into the dome.

5. A fuel pump for internal combustion engines for delivering fuel from the supply tank to the carburetor of the engine comprising a pumping chamber, a diaphragm pumping element cooperating therewith, an outlet passageway leading from said pumping chamber including an upwardly directed portion, said passageway increasing in cross sectional area towards the upper end thereof, a laterally directed outlet passage opening into the upwardly directed portion of said first mentioned passageway adjacent the portion at which the cross sectional area is increased and a vapor collecting pressure chamber having rigid walls immediately above the upper end of the upwardly directed portion of said first mentioned passageway, said pressure chamber increasing in cross sectional area towards the top portion thereof whereby to assist in the separation of vapors and gases from the flowing liquid fuel.

6. An apparatus for fuel flow from a liquid source to a place of use comprising a casing having a fuel inlet with a downwardly directed passage, a chamber in which the downwardly directed passage is located, an exit port from the said chamber at a point below the top of the same, a pumping chamber with which said exit port communicates and a vapor-trapping chamber having rigid walls connected to the outlet from said

pumping chamber for delivery of fuel therefrom, said fuel feed inlet having a vapor inlet port from the upper portion of the first mentioned chamber to said inlet.

5 7. An apparatus for fuel flow from a fuel source to a place of use comprising a casing having an inlet chamber adapted to accumulate fuel vapor therein and a pumping chamber with which said inlet chamber is arranged to communicate,
10 an outlet chamber having rigid walls for receiving the discharged vapor and fuel, and means including a liquid sealed inlet having a passageway to the upper portion of the inlet chamber for conducting to the formation of vapors in the inlet
15 chamber and conducting the same to the outlet chamber.

8. A fuel receiving and trapping chamber adapted to be positioned in a fuel feed line to receive fuel from a source of supply and to deliver
20 fuel to a closely adjacent pump operative to produce suction flow through said chamber comprising, a closed fuel receiving chamber, a fuel inlet passage leading into the top of said chamber, a fuel outlet passage from said chamber having intake at its lower end spaced below
25 the top of said chamber, whereby the top of said chamber forms a vapor trapping space, said inlet fuel passage being in communication with said vapor trapping space at a point precedent to the point of delivery from said fuel
30 inlet passage into said chamber, whereby the flow of fuel through said fuel inlet passage serves to draw fuel vapor from said vapor trapping space into admixture with the flowing liquid fuel.

35 9. A fuel receiving and trapping chamber adapted to be positioned in a fuel line to receive fuel from a source of supply and to deliver fuel to a closely adjacent pump operative to produce suction flow of fuel through said chamber comprising a closed fuel receiving chamber, a fuel
40 inlet passage leading into the top of said chamber and delivering fuel into said chamber at a point spaced below the top of said chamber, a fuel outlet passage from said chamber, having intake at
45 its lower end at a point spaced below the top of said chamber above the point of fuel delivery from said fuel inlet passage, whereby the top of said chamber forms a vapor trapping space, said fuel inlet passage having a restricted communication to the vapor trapping space at a point
50 precedent to the point of delivery from said fuel inlet passage into said chamber, whereby the flow of fuel through said fuel inlet passage serves to draw vapor from said vapor trapping space into
55 admixture with the flowing liquid fuel and produce a circulation of the fuel vapor within said chamber.

10. A fuel filtering and trapping chamber adapted to be positioned in a fuel line to receive
60 fuel from a source of fuel supply and to deliver fuel to a closely adjacent pump operative to produce suction flow of the fuel through said chamber, comprising a closed fuel receiving chamber, a fuel inlet passage leading into said
65 chamber from a source of fuel supply, a fuel outlet passage leading from said chamber having intake at its lower end within said chamber at a point spaced below the top of said chamber whereby the top of said chamber forms a vapor
70 trapping space, a filter screen within said chamber separating the intake of the fuel outlet passage from the delivery of said fuel inlet passage, said fuel inlet passage having a restricted communication with said vapor trapping space at a
75 point precedent to the delivery from said fuel in-

let passage into said chamber, whereby the fuel flow through said inlet fuel passage serves to draw vapor from said vapor trapping space into admixture with said flowing liquid fuel.

11. A fuel receiving and trapping chamber adapted to be positioned in a fuel line to receive fuel from a source of fuel supply and to deliver fuel to a closely adjacent pump operative to produce suction flow through said chamber, comprising a closed fuel receiving chamber, a substantially
80 tubular fuel inlet passage leading into said chamber and terminating at its lower end for delivery of the fuel into said chamber at a point concentric with said chamber and spaced below the top of said chamber, a fuel outlet passage from
85 said chamber having intake at its lower end at a point spaced below the top of said chamber but above the point of delivery from said fuel inlet passage whereby the top of said chamber forms a fuel vapor trapping space and means for producing a circulation of fuel vapor from said vapor trapping space through the flowing liquid fuel whereby a part of the fuel vapor is admixed with the flowing liquid fuel for delivery from said chamber.

12. A liquid accumulating chamber adapted to be positioned in a liquid supply line for intake from a source of supply and discharge to a closely adjacent pumping chamber comprising a closed liquid accumulating chamber, an inlet conduit
100 constituting part of the supply line leading into said accumulating chamber, an outflow conduit from said accumulating chamber having its intake open within said accumulating chamber at a level substantially below the top of the chamber, a venturi interposed in said inflow conduit at a point a substantial distance above the level of intake to said outflow conduit, said venturi having an air vent port proximate to its construction and means affording air communication from the upper part of said accumulating chamber to said Venturi vent port whereby the inflowing liquid is aerated at its discharge in the accumulating chamber.

13. A liquid accumulating chamber adapted to be positioned in a liquid supply line for intake from a source of supply and discharge to a closely adjacent pumping chamber comprising a closed liquid accumulating chamber, an inlet conduit
120 constituting part of the supply line leading into said accumulating chamber, an outflow conduit from said accumulating chamber having its intake open within said accumulating chamber at a level substantially below the top of the chamber, a venturi interposed in said inflow conduit at a point a substantial distance above the level of intake to said outflow conduit, said venturi having an air vent port proximate to its construction, means affording air communication from the upper part of said accumulating chamber to said Venturi vent port whereby the inflowing liquid is aerated at its discharge in the accumulating chamber and means for separating the aerated liquid at its discharge in the accumulating chamber.

14. A liquid accumulating chamber adapted to be positioned in a liquid supply line for intake from a source of supply and discharge to a closely adjacent pumping chamber comprising a closed liquid accumulating chamber, an inlet conduit
140 constituting part of the supply line leading into said accumulating chamber, an outflow conduit from said accumulating chamber having its intake open within said accumulating chamber at a level substantially below the top of the cham-
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ber, a venturi interposed in said inflow conduit at a point a substantial distance above the level of intake to said outflow conduit, said venturi having an air vent port proximate to its construction, means affording air communication from the upper part of said accumulating chamber to said Venturi vent port whereby the inflowing liquid is aerated at its discharge in the accumulating chamber and a filter screen in said accumulating chamber partitioning the liquid inflow discharge in said chamber from the intake to said outflow conduit.

15. A liquid accumulating chamber adapted to be positioned in a liquid supply line for intake from a liquid source and discharge to a closely adjacent pumping chamber, comprising a closed accumulating chamber, an inflow conduit leading into said chamber and downwardly therein for discharge at a substantial distance below the top of said chamber, an outflow conduit leading from said chamber and open for intake from said chamber at a level substantially below the top of said chamber but above the discharge from said inflow conduit whereby the upper space in said chamber becomes an air trap, a venturi interposed in said inflow conduit at a point therein a substantial distance above the point of intake to said outflow conduit, said venturi having an air vent port and means affording air communication from said air trapping space to said Venturi vent port.

16. In a fuel feeding system for internal combustion engines, a fuel pump casing having an inlet connection from a source of fuel supply for delivering fuel to a carbureter of an engine, said pump casing including an expansible and reducible pumping chamber, inlet and outlet check valves controlling the flow of fuel through said pumping chamber, a fuel receiving and trapping chamber between the inlet connection to said pump casing and the inlet check valve, said fuel receiving chamber including a vapor trapping space at the upper portion thereof, a vapor collecting pressure chamber between the outlet check valve and the outlet connection to said pump casing and means in said fuel receiving chamber for increasing the proportion of fuel vapor intermixed with the flowing liquid fuel whereby the fuel vapor separates from the liquid fuel and collects in said pressure trapping chamber on the outlet side of the pumping chamber.

17. In a fuel feeding system for internal combustion engines, a fuel pump casing having an inlet connection from a source of fuel supply and an outlet connection for the delivery of fuel to the carbureter of the engine, said pump including an expansible and reducible pumping chamber, inlet and outlet check valves for controlling the flow of fuel through said pumping chamber, a fuel receiving and trapping chamber on the suction side of said pumping chamber intermediate said inlet connection and said inlet check valve, the intake from said fuel receiving chamber to said pumping chamber being positioned below the top of said fuel receiving chamber, whereby the top of said fuel receiving chamber forms a vapor trapping space, means for admixing the liquid fuel flowing into said fuel receiving chamber with fuel vapor from said vapor trapping space, whereby the admixed liquid fuel and vapor is delivered to said pumping chamber, a vapor collecting pressure chamber having rigid walls on the outlet side of said pumping chamber above said outlet check valve and above the discharge connection from said pump and means associated with said pressure chamber for assisting the separation and collection of the fuel vapor in said pressure chamber.

18. In a fuel pump, a vertical fuel outlet passage, a valve seat in said passage, an outlet check valve seating downwardly upon said valve seat against the direction of fuel flow, a horizontal fuel outlet passage in communication with said vertical passage above said check valve, a vapor collecting pressure chamber having rigid walls and open at its bottom side positioned concentric with respect to said vertical fuel passage and above the level at which said passages are in communication, said chamber having a cross sectional area at its open side greater than the cross sectional area of the vertical fuel passage at said outlet check valve, a transverse support spanning the entrance to said chamber, a depending stem rigid with said support and a spring for seating said check valve positioned by said stem, the enlarged area tending to reduce the pressure on the fuel and vapor discharge upwardly through said vertical fuel passage and the transverse support serving to baffle the flow of the liquid fuel whereby the vapor separates from the liquid fuel and collects in said chamber.

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