C. F. GREEN.

FUEL FEED SYSTEM.

APPLICATION FILED NOV. 14, 1918.

1,346,196.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

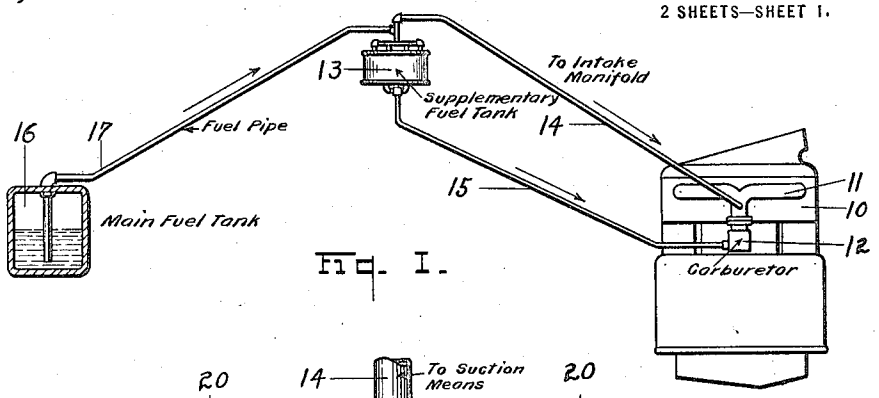


Fig. I.

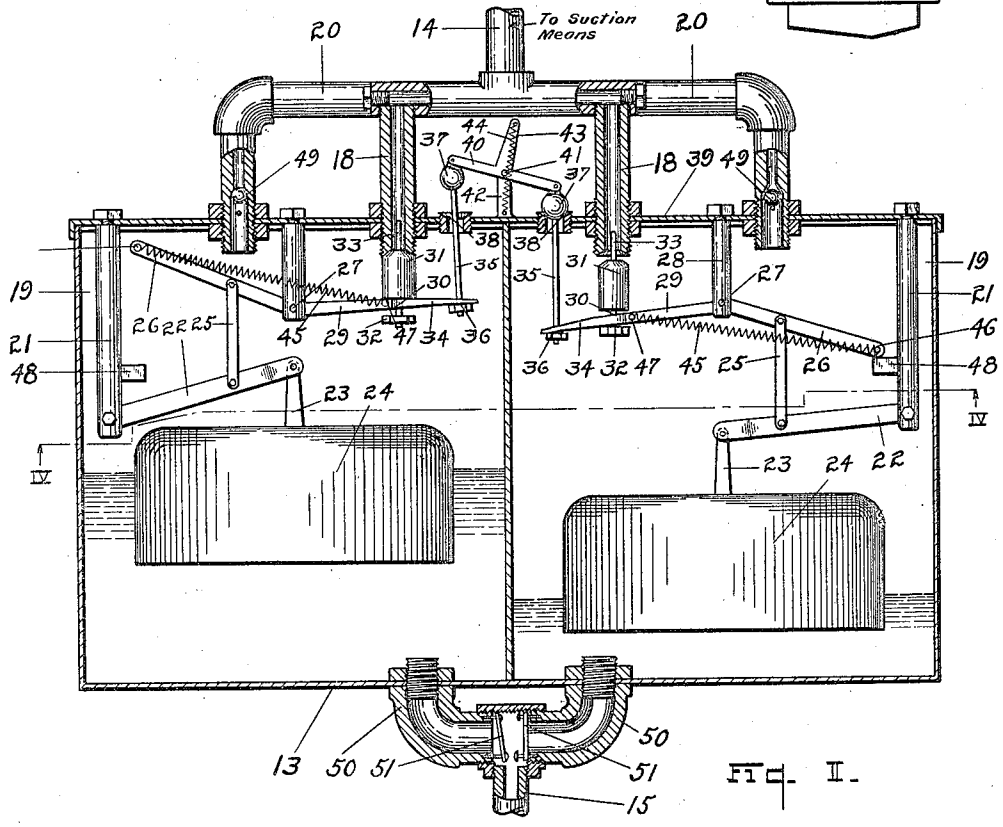


Fig. II.

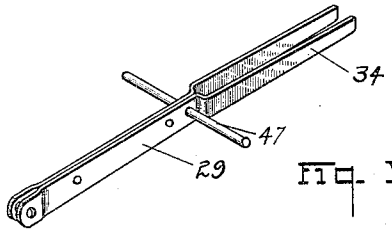


Fig. VI.

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2 SHEETS—SHEET 2.

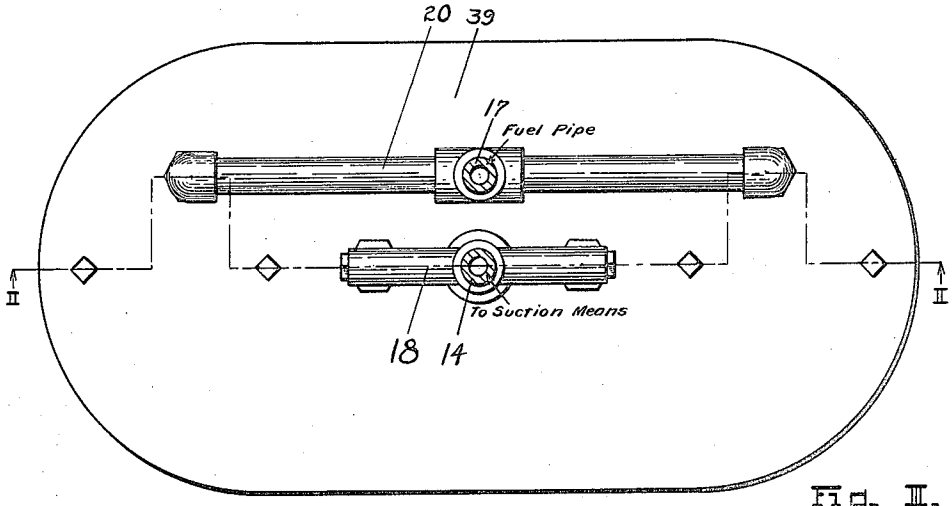


Fig. III.

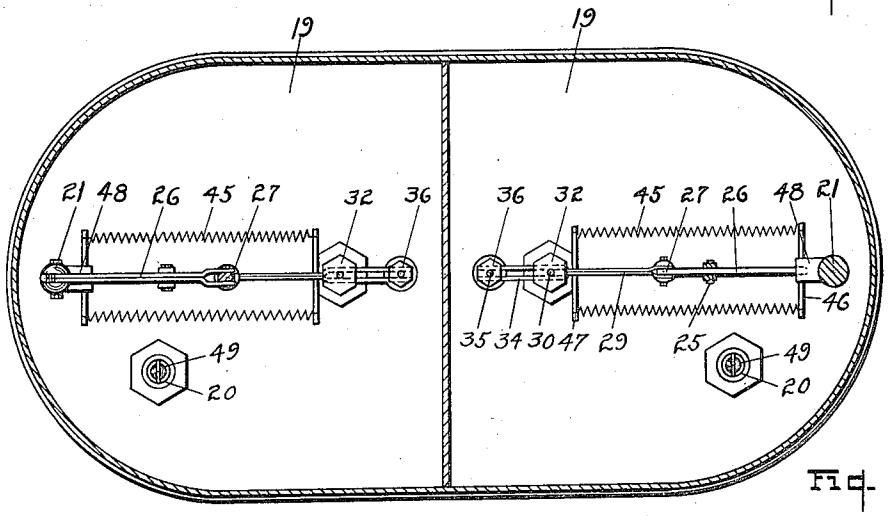


Fig. IV.

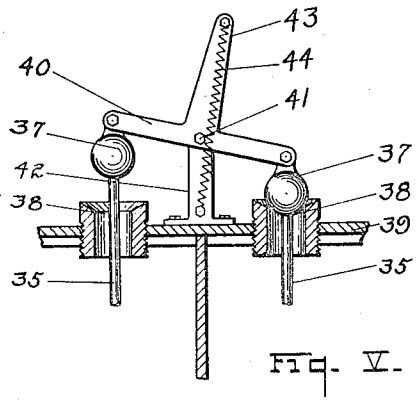


Fig. V.

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UNITED STATES PATENT OFFICE.

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FUEL-FEED SYSTEM.

1,346,196. Specification of Letters Patent. Patented July 13, 1920.

Application filed November 14, 1918. Serial No. 262,531.

To all whom it may concern:

Be it known that I, CHARLES F. GREEN, a citizen of the United States, residing at Defiance, county of Defiance, and State of Ohio, have invented certain new and useful Improvements in Fuel-Feed Systems, of which I declare the following to be a full, clear, and exact description.

My invention relates to fuel feed systems and has for its object to provide improved means for maintaining a constant head of fuel in a vacuum tank from which fuel is supplied to the carbureter of an internal combustion engine, the invention being adapted particularly for use in connection with the engines of automobiles and other self propelled vehicles.

A further object of the invention is to provide a plurality of vacuum fuel feed chambers each of which is dependent upon the other for its complete operation in delivering fuel from one point to another.

Still another object of the invention is to provide an improved fuel feed system in which there are a plurality of vacuum controlled chambers having mechanisms connected in such a manner that the operation of each effects a partial operation of the other to insure the alternate communication of said chambers with the atmosphere.

To these and other ends the invention comprises certain novel features of construction and arrangement of parts as will be hereinafter more fully described and claimed, it being understood that the device is susceptible to various modifications without departing from the spirit of the invention or sacrificing any of its advantages.

In the drawings, wherein I have shown the preferred embodiment of my invention:

Figure I is a diagrammatic view in elevation showing the manner of connecting the vacuum controlled tank with the main low level supply tank and the carbureter and manifold of an internal combustion engine.

Fig. II is a sectional elevation taken on the line II—II of Fig. III.

Fig. III is a top plan view of the vacuum controlled tank shown in Fig. II.

Fig. IV is a sectional plan taken on line IV—IV of Fig. II.

Fig. V is an enlarged fragmentary detail sectional view illustrating the air inlet valve arrangement for the vacuum chambers, and

Fig. VI is a detail perspective view of one of the valve operating levers.

Like reference characters throughout the several views of the drawings indicate corresponding parts.

Referring to the drawings 10 represents an internal combustion engine of any preferred type having a manifold 11 and carbureter 12 connected with a vacuum controlled tank 13 by means of the suction and fuel feed conduits 14 and 15 respectively, the vacuum tank 13 being connected with the main fuel supply tank 16 by means of the conduit 17 as shown in Fig. I. The suction conduit 14 includes the branch connections 18 leading to the separate vacuum controlled chambers 19 and the fuel supply conduit 17 includes the branch connections 20 which also lead to said vacuum controlled chambers.

Since in the present embodiment of my invention the two vacuum controlled chambers or receptacles are provided with duplicate parts I shall, for the sake of convenience, describe but one side of the device, though the same reference characters will be applied to all like parts of the drawings.

In the present invention, while I have shown the engine as the suction producing apparatus, it will be understood that any other form of aspirator may be substituted therefor without departing from the spirit of the invention and further that while the device is particularly adapted for the delivery of liquid fuel from the main low level supply source to the engine of a self-propelled vehicle, it is equally serviceable for transferring liquid of any kind in predetermined quantities from one point to another regardless of the character of the liquid it may be desired to handle.

Projecting into the vacuum chamber 19 is a post or standard 21 having a lever 22 pivoted thereon which in turn is pivotally connected with the upstanding member 23 of the float 24 as shown in Fig. II. Intermediate the ends of the lever 22 is provided an upstanding link 25 forming a pivotal connection between said lever and arm 26 pivoted at 27 to the downwardly projecting post 28. Also mounted upon the pivot 27 is a lever 29 shown in detail in Fig. VI which is preferably forked at its free end to straddle the stem 30 of the upwardly extending valve 31 provided for alternately opening and closing the branch pipe 18 of the suction conduit 14 in a manner which will presently be described. The valve stem

30 carries a nut 32 which is spaced from the valve a distance slightly greater than the thickness of the lever 29 in order to afford considerable play between the valve and nut in the swinging of the lever up and down on its pivot from time to time. The top of the valve 31 is also provided with a stem which is indicated at 33 and which projects into the suction passageway of the connection 18 as shown in Fig. II. This stem is smaller than the opening through said connection and serves to hold the valve in an upright position upon the lever 29.

Upon the free end of the lever 29 and between the spaced extensions 34 thereof is provided an upstanding rod 35, at the bottom of which is a nut 36 on which the lever extensions 34 rest as shown in Fig. II, while at the top of said rod is a valve 37 serving to close the air inlet opening 38 in the top 39 of the tank 13. The two air inlet valves 37 are pivotally connected to the opposite ends of a lever 40 which is pivoted intermediate its ends at 41 to an upstanding member 42 carried by the top 39 of the tank 13. Extending upwardly from the center of the lever 40 is an arm 43 at the top of which is connected one end of a light spring 44 the bottom end of which is connected preferably to the standard 42 at a point beneath the pivot 41 of the lever 40. The spring 44 serves to hold the lever 40 in either of its extreme positions of movement, one of which is indicated in Fig. II, said spring also serving when moved on either side of the pivot 41 to snap the downwardly descending air inlet valve upon its seat, thereby insuring the holding of the same in proper position until said valve is actuated by the float controlled mechanism in the opposite chamber, after a predetermined amount of fuel has been fed therefrom.

Likewise the suction controlled valves 31 are snapped into open and closed position by the springs 45 which extend upon opposite sides of the pivots 27, upon which the arms 26 and levers 29 are carried, said springs being connected with the lateral projections 46 and 47 of said arms and levers respectively as shown in Fig. IV. In order to limit the downward movement of the floats 24 and connected parts, the standards 21 are provided with stops 48 upon which the outer ends of the arms 26 are adapted to rest when the floats reach predetermined points within the tanks.

The connections 20 of the fuel supply conduit 17 are provided with ball-valves 49, each of which automatically closes when suction is produced in the opposite chamber whereby said chamber is cut off from atmospheric pressure, as otherwise air would be drawn through the air inlet passageway of the chamber which is supplying fuel to the carbureter and thence through said connections 20 into the chamber in which the vacuum is created.

The engine or carbureter supply conduit 15 is connected with the separate chambers 19 of the tank 13 by means of the branch connections 50 having the flap valves 51 which automatically open and close, depending upon which chamber is connected with the suction producing apparatus.

In the operation of my improved fuel feed device, assuming that the valve 31 in the left hand chamber of Fig. II has just been closed and the corresponding valve in the opposite chamber opened to place the latter chamber in communication with the suction producing apparatus, fuel will then begin to flow by gravity from the left hand chamber to the carbureter. In the meantime, the right hand chamber is being filled and should the required amount of fuel be fed thereto before enough of the fuel has been consumed by the engine to deplete the supply in the left hand chamber sufficiently to cause the opening of the valve controlling the suction passageway leading thereto, then, of course, the corresponding valve 31 in the opposite chamber would be closed but the air inlet valve thereof will also remain closed. However, as soon as the float in the left hand chamber reaches a predetermined point during its descent, the suction valve controlled by said float will be opened and it is at this time that the air inlet valve of the chamber will be closed by the downward pull of the lever 29 on the valve rod 35 and the opposite air inlet valve opened by the rocking of the lever 40 at which time the spring 44 is moved past the dead center to snap said lever into position to tightly close the air inlet valve of the left hand chamber. By this arrangement it will be seen that the alternate opening and closing of the air inlet valves is effected by means of the lever connecting said valves and the float controlled levers 29 connected therewith through the valve rods 35, but the operation of said air inlet valves is effected only by the downward movement of the floats while the valves controlling the suction passageways are actuated by movement of the floats in either direction.

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

1. In a fuel supply system, the combination of a fuel supply source, an aspirator, a plurality of fuel holding chambers, each connected with said aspirator and said fuel supply source, and each having fuel outlet and air inlet passages, valves for the suction and air inlet passages of each of said chambers, means controlled by the rise and fall of the liquid in said tanks for alternately opening and closing said suction valves, and means connecting said air inlet

valves whereby closure of the one will effect the opening of the other, and the opening of either will effect the closure of the other, said last mentioned means being actuated by said liquid controlled means.

2. In a fuel feed system, the combination of a fuel supply source, an aspirator, oppositely arranged fuel holding chambers, each connected with said aspirator and said fuel supply source, and each having a fuel outlet and an air inlet passage, a valve for the suction passage of each of said chambers, a valve for the air inlet passage of each of said chambers, a direct pivotal connection between said air valves, and actuating means for the suction valves adapted to effect the alternate opening of the same and shifting of the air inlet valves and closing of said suction valves independently of said air valves.

3. In a fuel feed system, the combination of a fuel supply source, an aspirator, oppositely arranged fuel holding chambers each connected with said aspirator and said fuel supply source, and each having a fuel outlet and an air inlet passage, a valve for the suction passage of each of said chambers, a valve for the air inlet passage of each of said chambers, a member pivoted intermediate its ends and pivotally connected with each of said air inlet valves, means adapted to alternately open and close the suction passage valves and connections between said last mentioned means and the air inlet passage valves whereby said pivotal member is rocked on its pivot to effect the seating and unseating of the two air inlet valves respectively, only when said first mentioned means operates to open one of said suction passage valves.

4. In a fuel feed system, the combination of a fuel supply source, an aspirator, oppositely arranged fuel holding chambers each connected with said aspirator and said fuel supply source, and each having a fuel outlet and an air inlet passage, a valve for the suction passage of each of said chambers, a valve for the air inlet passage of each of said chambers, a member pivoted intermediate its ends and pivotally connected with each of said air inlet valves, means adapted to alternately open and close the valves for said suction passages and connections between said last mentioned means and the valves for said air inlet passages whereby said pivotal member is rocked on its pivot to effect the alternate seating and unseating of the air inlet valves, and yieldable means adapted to temporarily hold said pivoted member in each of its extreme positions of movement when rocked by said valve actuating means.

In testimony whereof I affix my signature.

CHARLES F. GREEN.