W. JAY.

LIQUID SUPPLY SYSTEM FOR EXPLOSIVE ENGINES.

APPLICATION FILED FEB. 24, 1914.

1,132,273.

Patented Mar. 16, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

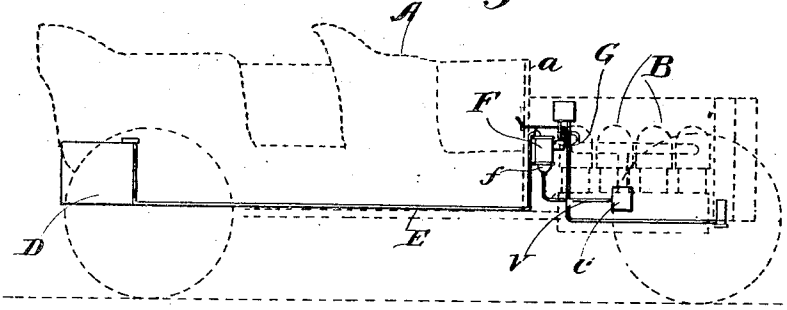
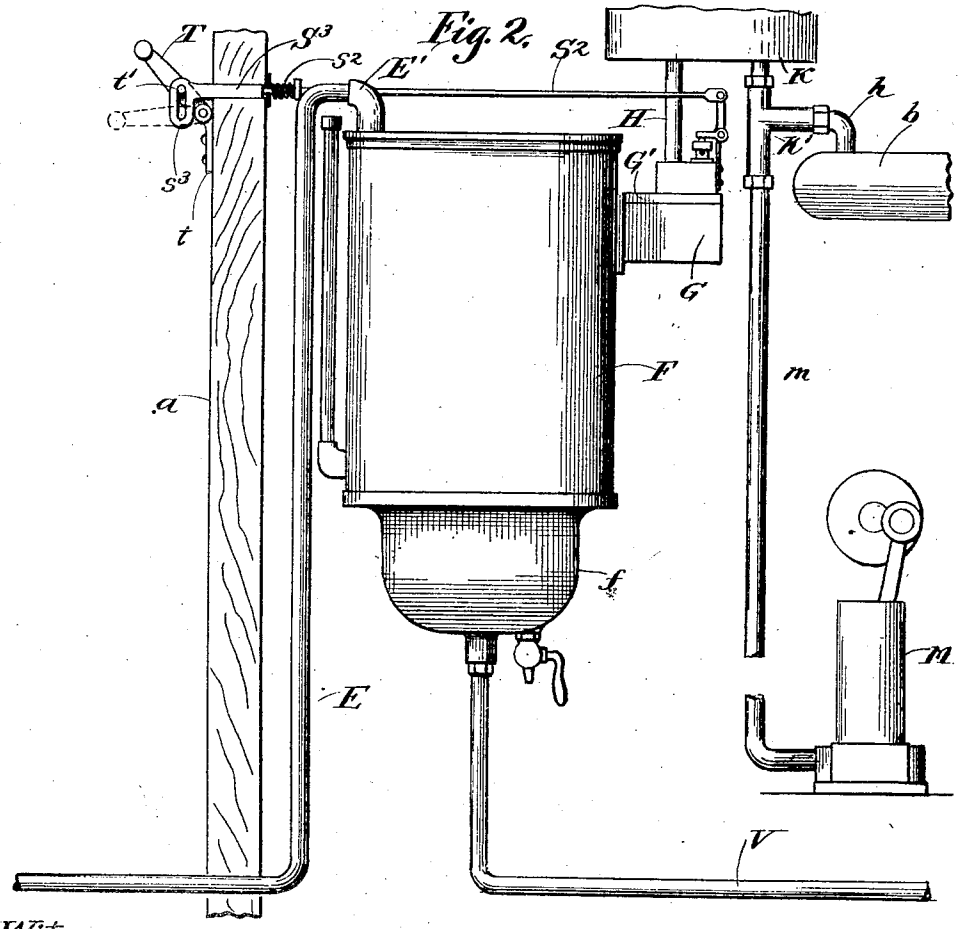


Fig. 2.



Witnesses:

C. E. Burnap

Henry A. Parker

Inventor:

Webb Jay

By Sheridan, Wilkinson & Scott Attys.

W. JAY.

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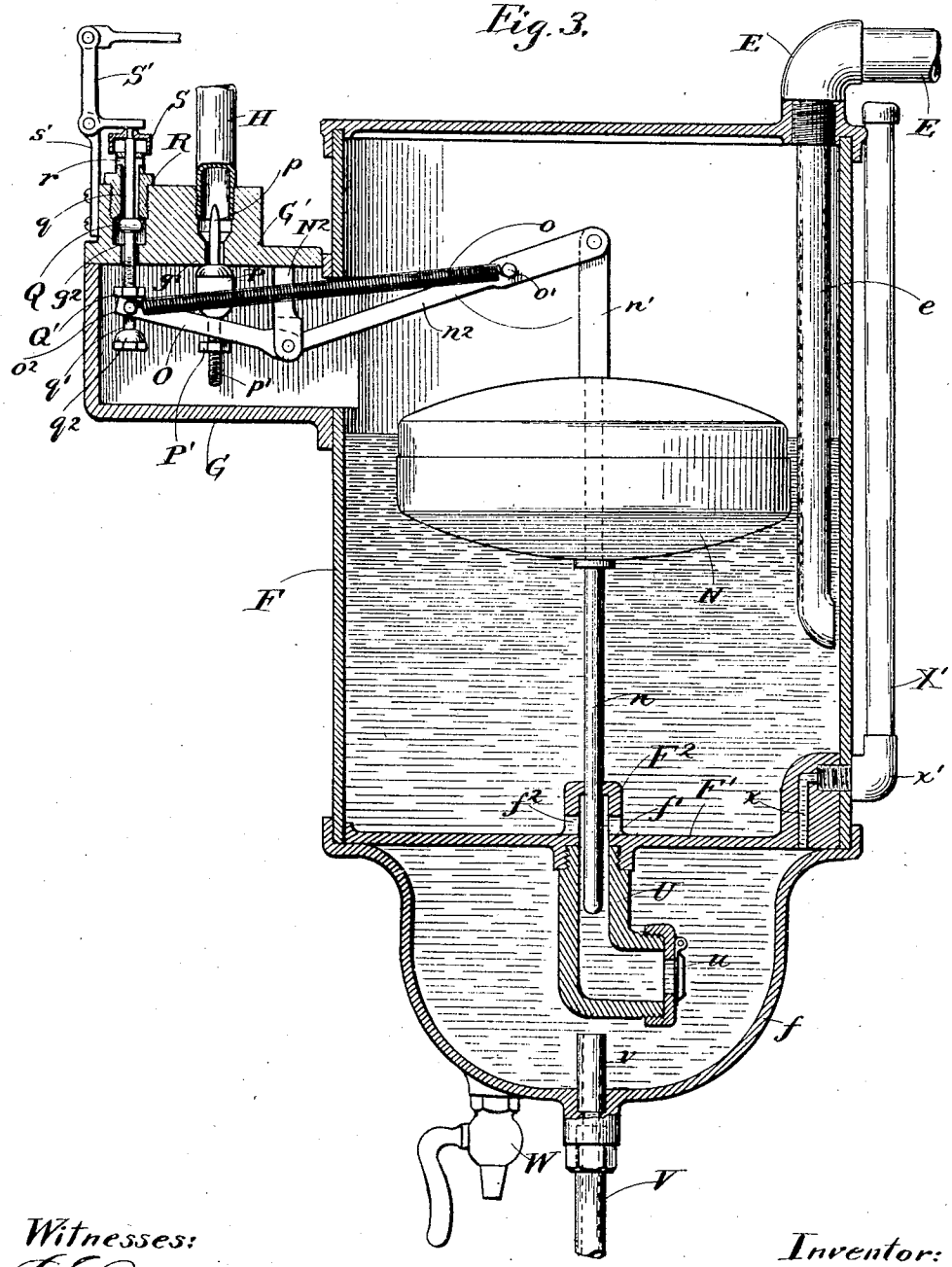
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3 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

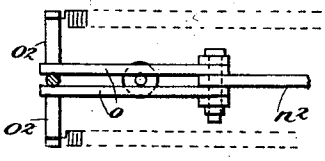


Fig. 5.

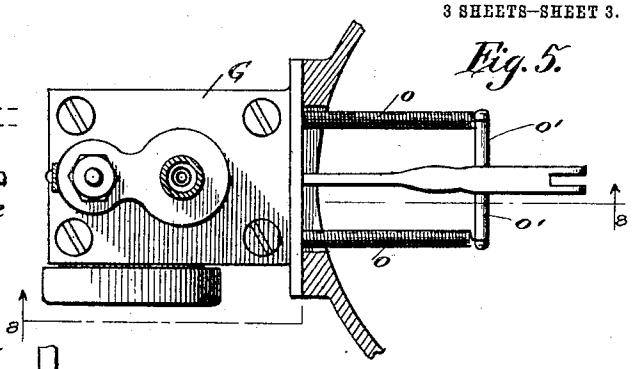


Fig. 6.

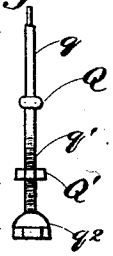
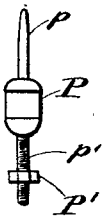


Fig. 7.



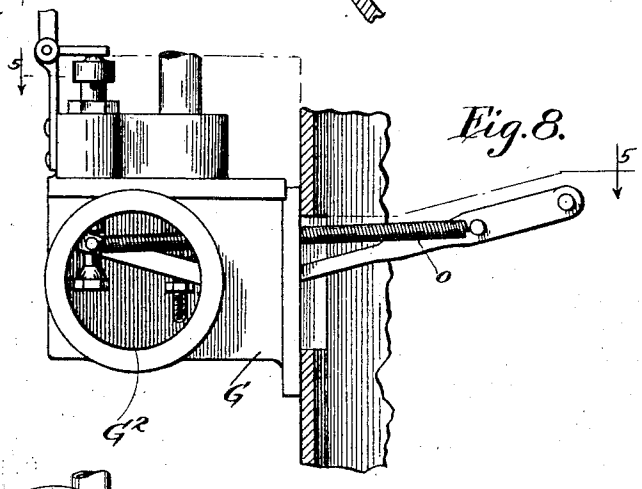
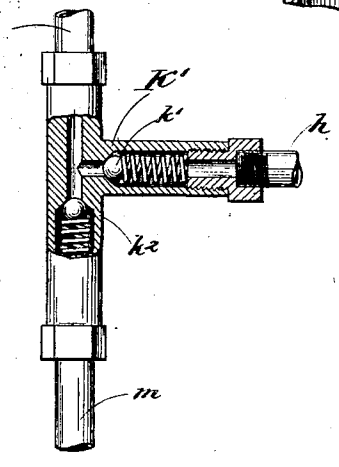


Fig. 8.

Fig. 9.



Witnesses:

C. E. Burnap

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Inventor:

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UNITED STATES PATENT OFFICE.

WEBB JAY, OF CHICAGO, ILLINOIS.

LIQUID-SUPPLY SYSTEM FOR EXPLOSIVE-ENGINES.

1,132,273. Specification of Letters Patent. Patented Mar. 16, 1915.

Application filed February 24, 1914. Serial No. 820,742.

To all whom it may concern:

Be it known that I, WEBB JAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Liquid-Supply Systems for Explosive-Engines, of which the following is a specification.

My invention relates in general to explosive engines, and more particularly to mechanism for supplying fuel to the explosive engines of automobiles.

My invention more especially relates to improvements in the invention covered by my copending application Serial No. 789,513, filed September 12, 1913.

The construction of many modern automobiles is such that the tank containing the liquid fuel is located below the level of the carbureter, and hence it is necessary to maintain a sufficient pressure in the tank to force the fuel through the conduit leading therefrom to the level of the carbureter. Automatic means have heretofore been provided for maintaining the requisite pressure in the fuel tank, but such means frequently become inoperative, thereby necessitating the almost constant use of a hand pump to produce sufficient pressure in the tank to secure the supply of fuel to the carbureter. Furthermore, difficulty often arises through leakage thereby allowing the pressure to escape from the tank so that the fuel will not be forced to the level of the carbureter.

In the invention covered by my said copending application the necessity for maintaining the fuel supply under pressure is obviated by means of a receptacle located above the plane of, and connected with the carbureter, in which the pressure is periodically reduced so as to lift thereinto liquid fuel from the main supply tank thereof. The practical use of the invention covered by my said co-pending application has suggested certain improvements therein to which my present application is directed.

One of the objects of my present invention is to provide an apparatus of the type covered by my said co-pending application for supplying liquid fuel to the carbureter of an explosive engine, in which the fuel will flow by gravity to the carbureter during the intervals that the fuel supply receptacle is connected with the engine intake, thereby providing an uninterrupted supply of fuel to the carbureter regardless of the pressure in the supply receptacle.

A further object of my present invention is to provide an improved automatic valve mechanism, for an apparatus of the character referred to, by the operation of which the fuel supply receptacle will be alternately connected with the engine intake and with the atmosphere according to predetermined low and high fuel levels in the receptacle.

A still further object of my present invention is to provide an apparatus, of the character referred to, in which the connection between the fuel supply receptacle and the engine intake may be maintained after the normal high level of fuel in the receptacle has been reached in order that a limited quantity of fuel may pass directly from the receptacle to the engine intake to form a rich priming charge for subsequently starting the engine.

A final object of my present invention is to provide an improved apparatus for supplying fuel to an explosive engine which will be simple in construction, convenient in use, and efficient in operation.

It will be obvious that other liquids than fuel may be fed by the devices described and adapted to feed liquid fuel from a low level tank to a receptacle at a higher level, and this without regard to the ultimate destination for which the liquid is designed after it leaves said elevated receptacle. My invention contemplates the use of the devices described not limited to the character of the liquid or its destination.

My invention will be more fully disclosed hereinafter with reference to the accompanying drawings in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is an elevational view of my invention, the relation thereof to an automobile being indicated by showing the outline of the automobile in dotted lines; Fig. 2 an enlarged vertical section through the dash-board of an automobile, showing in elevation the positions relatively thereto of the parts of my invention; Fig. 3 an en-

larged vertical section through the supply receptacle and valve mechanism controlling the connection thereof with the engine intake and with the atmosphere; Fig. 4 a detail plan view of a part of the valve mechanism; Fig. 5 a plan view of the chamber containing the valve mechanism, certain parts being shown in section; Fig. 6 an elevational view of the valve controlling the air inlet; Fig. 7 a perspective view of the valve which controls the connection with the engine intake; Fig. 8 a side elevation of the chamber containing the valve mechanism, the adjacent portion of the receptacle being shown in vertical section; and Fig. 9 a detail sectional view of the coupling for connecting the engine manifold and an independent exhauster with the fuel supply receptacle.

Similar characters are used to designate similar parts in the several figures of the drawings.

Reference A indicates an automobile of any suitable construction, the same being shown in dotted lines. The engine cylinders are also indicated in dotted lines at B.

C designates a carbureter of any suitable construction for supplying the explosive mixture to the intake of the engine cylinders.

D designates a storage tank for containing a supply of gasolene or other liquid fuel. The tank D is located at a level below the carbureter of the engine cylinders.

The parts above described do not in themselves constitute my invention, as they are such as are commonly in use at the present time. They are, however, illustrated in order that my improvement may be fully disclosed, it being understood that my improvement is not limited in its application to any particular construction of automobile or of the engines and carbureter.

E designates a conduit leading from the fuel tank D to a point slightly in front of the dash-board *a* of the automobile, which extends to a coupling E′ on the cover of a fuel supply receptacle F.

e designates a pipe communicating with the inner end of the coupling E′ and terminating within the receptacle F adjacent the bottom thereof. The receptacle F is supported in any convenient manner at a level above that of the carbureter C, and preferably within the usual hood of the automobile.

G designates a valve chamber supported upon the receptacle F and communicating with the interior thereof.

H designates a conduit connected with the cover G′ of the valve chamber G and communicating with a passage through the cover with the interior of the valve chamber. The conduit H leads to and communicates with the engine manifold *b*. Preferably the conduit H is connected with the manifold *b* through the medium of a closed chamber K and a T-shaped coupling K′. One branch of the T-shaped coupling K′ is connected by the short curved pipe section *h* with the manifold *b*, while the other branch of the coupling K′ is connected by pipe *m* with the intake of any suitable air compressor M, such for instance as is provided on many automobiles for pumping up the tires, creating a pressure on the fuel supply, or providing motive power for operating the transmission mechanism. In the branches of the coupling K′, which communicate with the manifold and with the supplemental exhauster, are provided check valves such as k', k^2 which are normally seated toward the receptacle K by springs, as shown in Fig. 9.

N designates a float located within the receptacle F provided with a post n' projecting upwardly from and secured to the top thereof. Pivotally connected at the upper end of the post n' is a link n^2 pivotally connected to a post N^2 depending from the cover G′ of the valve chamber. Also fulcrumed upon the post N^2 is a pair of links O which straddle the adjacent end of the link n^2. Two springs *o* are interposed between and connected to pins o', o' projecting in opposite directions from the link n^2 and to pins o^2, o^2 projecting in opposite directions from the ends of the links O opposite to the ends thereof which are fulcrumed upon the post N^2.

P designates a valve coöperating with a valve seat formed at the inner end of the passage in the cover G′ which communicates with the engine manifold through the conduit H. The valve P is provided with a depending screw-threaded rod p', which extends between the links O so that the valve is supported upon the upper surfaces of said links. A nut P′ engages the portion of the screw-threaded rod p' below the links O.

p designates a rod projecting upwardly from the valve P and extending through the passage in the cover G′, so as to guide the valve in its movements toward and away from its coöperating seat.

Q designates a valve for controlling the communication of the valve chamber G with the atmosphere, such valve being located within a recess in the cover G′. A screw-threaded rod q' depends from the valve Q and loosely extends through the passageway through the cover G′ leading from the valve chamber to the recess in which the valve Q is located. A nut Q′ is adjustably located upon the screw-threaded rod q' and overlies the ends of the links O which straddle the rod below said nut.

q^2 designates a stop nut located on the lower end of the rod q' and underlying the

outer ends of the links O. An exteriorly screw-threaded plug R engages within the recess in the cover G′ in which the valve Q is located, such plug having an opening *r* therethrough leading to the exterior of the cover G′ and through which air may pass into the valve chamber G when the valve Q is in the unseated position shown in Fig. 3.

S designates a cap which overlies and rests upon the upper end of a rod *q* which projects upwardly from the valve Q and loosely extends through the opening in the plug R.

S′ designates a bell crank lever fulcrumed upon a bracket *s′* secured to the cover G′. The lower arm of the bell crank lever S′ overlies the cap S and when oscillated depresses the cap and through the medium of the rod *q* seats the valve Q. The other arm of the bell crank lever S′ is pivotally connected to the rod S^2 which terminates in a portion S^3 extending through the dash-board *a* and having a slotted portion s^3 adjacent the inner surface of the dash-board. A lever T is fulcrumed upon a bracket *t* on the inner surface of the dash-board, and is provided with a pin *t′* which extends through the slot in the adjacent portion s^3 of the reciprocating rod S^2. The relation of the pin *t′* and the slot which it engages is such that when the lever is moved downwardly, as indicated in dotted lines in Fig. 2, the bell crank lever S′ will be reciprocated to seat the valve Q, while the position of the lever T, shown in full lines, will oscillate the bell crank lever to permit the valve Q to unseat. A spring s^2 is interposed between the dash-board *a* and a collar on the rod S^2 so as to exert a pressure normally retaining the bell crank lever S′ in position to permit the valve Q to open.

Beneath the receptacle F is provided a chamber *f* which is connected with the lower end of the receptacle and together with the bottom wall F′ thereof forms a compartment which is automatically disconnected from the interior of the receptacle F when the pressure is exhausted therefrom.

F^2 designates a hollow projection extending upwardly from the inner surface of the bottom F′ for the receptacle, which is provided with side openings *f′*, f^2 and which communicates through an opening in the bottom of the receptacle with the interior of a hollow coupling U, the latter being supported at the under surface of the bottom F′ of the receptacle. The coupling U is deflected laterally at its lower end and supports a check valve *u* which is normally closed and opens when the pressure in the receptacle, F, exceeds that in chamber or compartment, *f*, and closes when the pressure in the receptacle F is below that in the chamber or compartment *f*.

V designates a conduit which leads from the chamber *f* to the carbureter C. The end of the conduit V which communicates with the interior of the chamber *f* is provided with an upwardly projecting terminal *v* so as to form a trap in the bottom of the chamber for water which may be drawn off through a pet-cock W. The interior of the compartment *f* is at all times exposed to atmospheric pressure through the passage *x* formed at one side of the bottom F′ of the receptacle F and through the elbow coupling *x′* and standpipe X′ projecting upwardly therefrom.

The operation of my invention is as follows: When the parts are in the position shown in full lines in Fig. 3 the liquid fuel flows from the receptacle F through the opening in the bottom wall thereof into the depending coupling U and thence into the compartment *f*. The fuel then passes through the conduit V to the carbureter where it is mixed with air to form an explosive mixture to be supplied to the engine cylinders. As the liquid fuel is supplied from the receptacle F to the carbureter and the liquid level gradually lowers in the receptacle, the float N correspondingly falls, it being guided in its movements by means of its depending stem *n* which extends through the projection F^2 into the vertical portion of the coupling U. When the float N has lowered to such a point that the pins *o′* have carried the ends of the springs *o* connected thereto sufficiently low for the line of the springs to be below the fulcrums of the links n^2 and O upon the post N^2, the links O will be oscillated downwardly, thereby lowering the air valve Q into engagement with its seat g^2 and discontinues the communication of the receptacle with the atmosphere, and also permits the valve P to drop away from its seat *g′*. The interior of the receptacle F is consequently placed in communication with the conduit H and thence in communication with the exhaust mechanism comprising either the engine itself, or the supplemental exhauster M, such communication with the exhaust mechanism being preferably through the exhaust tank K. The pressure in the receptacle F is consequently immediately lowered so that gasolene, or other liquid fuel, will be lifted from the supply tank D through the conduit E and depending portion *e* thereof into the receptacle F. The liquid fuel continues to flow into the receptacle F until the float N has been lifted substantially to the position shown in Fig. 3 in which the plane of the springs *o* has passed above the fulcrum point of the links O, and the links consequently oscillated upwardly. This movement of the links O lifts the valve P against its seat *g′*, thereby disconnecting the receptacle F from the exhaust mechanism, and simultaneously lift-

ing the valve Q above its seat so as to place the interior of the receptacle in communication with the atmosphere. During the interval that the receptacle F is connected with the exhaust mechanism the valve u is closed and the fuel stored in the compartment f passes through the conduit V to the carbureter, thereby continuing the requisite supply to the carbureter during the interval when the receptacle F is being refilled. The free flow of the fuel from the compartment f to the carbureter is insured by reason of the continuous connection of the interior of the compartment with the atmosphere through the standpipe X'.

When it is desired to supply to the engine cylinders a rich priming mixture for subsequently starting the engine, the lever T is pressed downwardly into the position shown in dotted lines in Fig. 2, thereby oscillating the bell crank lever S' so as to seat the air valve Q, and through the corresponding downward movement of the links O to permit the valve P to open. The receptacle F therefore continues to communicate with the exhaust mechanism regardless of the level of the float N, so that liquid fuel will be drawn from the receptacle through the conduit H into the manifold b, thence to the engine cylinders. This operation may also be resorted to when the engine is cool and the normal mixture supplied through the carbureter is consequently not sufficiently rich to produce the normal operation of the engine until it has been warmed by the rich mixture supplied directly thereto from the receptacle F.

The suction created by the reciprocation of the piston in the engine cylinders is amply sufficient under normal conditions to effect the lifting of the liquid fuel from the supply tank into the feed receptacle F, but, if desired, a connection, as above described, may also be made with an auxiliary exhauster which may prove of advantage when the reciprocations of the piston in the engine cylinders are reduced by climbing long hills on high speed.

When the chamber, K, is provided on the conduit from the receptacle, F, to the manifold, as illustrated by the operation of the exhaust device during the time when the liquid is flowing out of the receptacle, F, into the chamber or compartment, f, the suction valve P being closed, and the atmosphere valve, Q, being open, there will be produced in the chamber, K, as high a partial vacuum as is in the power of the exhaust devices, and it may amount to nearly a complete vacuum. Now when the valves are reversed, the suction valve, P, being open and the atmosphere valve, Q, being closed, there will immediately be produced in the receptacle, F, a condition of partial vacuum by equalization of the pressures in K and F, and an inflow of liquid from the main tank to the receptacle, F, will occur at once and rapidly, whereas in the absence of the chamber, K, several strokes of the exhaust device,—or of the engine when suction from it is relied upon for producing partial vacuum,—would have to occur before the liquid inflow would have been produced to any such extent. This expedient is of importance also for the purpose of priming the engine,—that is, affording it an extra fuel supply necessary for proper action when the engine is cold. For such use of the device the engineer, before stopping the engine, will operate the lever, T, and thereby the lever, S^1, to hold the valve, P, open after it would otherwise be closed by the rise of the float, and to thus cause the receptacle, F, to be filled with liquid to a higher level than would normally be the case; then releasing the lever, T, the valve, P, will instantly be closed by the float and the final strokes of the engine before stopping will cause the exhaust device (or the engine itself) to produce the high vacuum described in the chamber, K; and this will be the condition when the engine is again started; and upon starting, the engineer operating the lever, T, to open the suction valve, P, will admit the high suction from K, upon the receptacle, F, and draw the liquid with which the receptacle is substantially filled over into the chamber, K, from which it will at once reach the check valve, k^1, and be drawn there-past into the manifold and cylinder by the suction of the engine.

I do not limit myself to the specific devices shown for controlling the alternation between atmospheric pressure and partial vacuum in the elevated fuel receptacle, nor to the specific means shown for maintaining the supply of fuel for gravity feed to the carbureter is at all times under atmospheric pressure though supplied from a chamber which alternates the atmospheric pressure and partial vacuum; and any modification of the devices shown for these purposes which would readily occur to one familiar with the art may be made without departing from my invention.

I claim:

1. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above said tank; a conduit leading from said tank to said receptacle; a conduit leading from said receptacle for discharge by gravity therefrom; exhaust means for reducing the pressure in said receptacle below that of the atmosphere; valve mechanisms for alternately connecting said receptacle with said exhaust means and with the atmosphere; means for automatically actuating said valve mechanism to connect the receptacle with the exhaust means and disconnect the receptacle

from the atmosphere when the liquid in said receptacle reaches a predetermined low level, and for simultaneously discontinuing the connection of the receptacle with the exhaust means and connecting the receptacle with the atmosphere when the fuel in the receptacle reaches a pre-determined high level.

2. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above said tank; a conduit leading from said tank to said receptacle; a conduit leading from said receptacle for discharge by gravity therefrom; exhaust means for reducing the pressure in said receptacle below that of the atmosphere; valve mechanisms for alternately connecting said receptacle with said exhaust means and with the atmosphere; means for automatically actuating said valve mechanism to connect said receptacle with the exhaust means and disconnect the receptacle from the atmosphere when the liquid in said receptacle reaches a pre-determined low level, and for simultaneously discontinuing the connection of the receptacle with the exhaust means and connecting the receptacle with the atmosphere when the liquid in said receptacle reaches a pre-determined high level, and means for retaining said valve mechanism in position to connect the receptacle with the exhaust means and to disconnect the receptacle from the atmosphere regardless of the liquid level in said receptacle.

3. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above said tank; a conduit leading from said tank to said receptacle; a conduit leading from said receptacle for discharge by gravity therefrom; exhaust means for reducing the pressure in said receptacle below that of the atmosphere; a valve controlling the communication between said receptacle and said exhaust means; a valve controlling the communication of said receptacle with the atmosphere, and means for automatically unseating said first valve and seating said second valve simultaneously when the liquid in said receptacle reaches a pre-determined low level, and for simultaneously seating said first valve and unseating said second valve when the liquid in said receptacle reaches a pre-determined high level.

4. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above said tank; a conduit leading from said tank to said receptacle; a conduit leading from said receptacle for discharge by gravity therefrom; exhaust means for reducing the pressure in said receptacle below that of the atmosphere; a valve controlling the communication between said receptacle and said exhaust means; a valve controlling the communication of said receptacle with the atmosphere; means for automatically opening said first valve and closing said second valve when the liquid in said receptacle reaches a pre-determined low level, and for closing said first valve and opening said second valve when the liquid in said receptacle reaches a pre-determined high level, and means for retaining said first valve open and said second valve closed regardless of the liquid level in said receptacle.

5. In combination with a main low-level liquid supply tank; a liquid fuel receptacle located in a plane above said tank; a conduit leading from said tank to said receptacle; exhaust means for reducing the pressure in said receptacle below that of the atmosphere; means for automatically controlling the connection between said receptacle and said exhaust means according to the amount of liquid in said receptacle; an auxiliary receptacle into which liquid flows from said first receptacle; a conduit leading from said auxiliary receptacle for discharge by gravity therefrom, and means controlling communication between said liquid supply receptacle and said auxiliary receptacle, adapted to be opened by gravity flow from said supply to said auxiliary receptacle.

6. The combination with an explosive engine of a carbureter for supplying an explosive mixture to the engine cylinder; a fuel supply tank; a fuel supply receptacle located in a plane above said tank, and constructed for containing liquid above the level of the fuel discharge in the carbureter; a liquid supply conduit leading from said tank to said receptacle; a liquid feed conduit leading from said receptacle to the carbureter; a suction conduit connecting the receptacle with the engine intake, said conduit comprising an enlargement constituting an air chamber; valves which respectively control the communication of said fuel supply receptacle with the atmosphere and with said exhaust means; mechanism which operates said valves to simultaneously close one and open the other for alternately connecting said receptacle with said exhaust means and with the atmosphere, and means controlled by the fuel level in said receptacle for automatically actuating said valve-operating mechanism.

7. The combination with an explosive engine of a fuel supply tank located below the plane of the engine intake; a fuel supply receptacle located in a plane above that of said tank; a liquid supply conduit leading from said tank to said receptacle; a conduit for supplying fuel by gravity from said receptacle to the engine; a chamber with which said receptacle communicates; means communicating with said chamber for reducing the pressure therein below that of the atmosphere, and means automatically control-

ling the connection between said receptacle and chamber according to the amount of fuel in said receptacle.

8. The combination with an explosive engine of a carbureter for supplying an explosive mixture to the engine cylinder; a fuel supply tank; a fuel supply receptacle located in a plane above said tank and constructed for containing liquid above the level of the fuel discharge in the carbureter; a liquid supply conduit leading from said tank to said receptacle; a liquid feed conduit leading from said receptacle to the carbureter; an exhaust means and an exhaust conduit therefrom to the receptacle comprising an enlargement constituting an air chamber on its course; a conduit leading from the engine intake into said exhaust conduit at a point in the latter between the air chamber and the exhaust means, and check valves in the exhaust conduit and the engine intake conduit between their junction and the exhaust means and the intake respectively.

9. The combination with an explosive engine of a fuel supply tank located below the plane of the engine intake; a fuel supply receptacle located in a plane above that of said tank; a conduit leading from said tank to said supply receptacle; an auxiliary receptacle into which fuel flows from said supply receptacle; a conduit for supplying fuel from said auxiliary receptacle to the engine; exhaust means for reducing the pressure in said supply receptacle below that of the atmosphere; means for alternately connecting said supply receptacle with the exhaust means and with the atmosphere, and means controlling communication between said liquid supply receptacle and said auxiliary receptacle, adapted to be opened by a gravity flow from said supply to said auxiliary receptacle.

10. The combination with an explosive engine of a fuel supply tank located below the plane of the engine intake; a fuel supply receptacle located in a plane above that of said tank; a conduit leading from said tank to said receptacle; a conduit for supplying fuel by gravity from said receptacle to the engine; a chamber with which said receptacle communicates; an auxiliary exhausting means; means connecting said chamber with the engine manifold and with said auxiliary exhausting means for reducing the pressure in said chamber below that of the atmosphere, and means for automatically controlling the connection between said receptacle and chamber according to the amount of fuel in said receptacle.

11. The combination with an explosive engine of a carbureter for supplying an explosive mixture to the engine cylinders; a fuel supply tank; a fuel supply receptacle, located in a plane above said tank and carbureter; a conduit leading from said tank to said receptacle; a conduit through which fuel is supplied by gravity from said receptacle to the carbureter; an auxiliary exhaust means, and means connecting said receptacle with the manifold of the engine cylinder and with said auxiliary means for reducing the pressure of said receptacle below that of said tank.

12. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above that of said tank; a conduit leading from said tank to said receptacle; means for producing a partial vacuum in said receptacle above the liquid therein; a conduit leading from said receptacle for supplying liquid to the engine intake; a valve controlling communication between said receptacle and the partial vacuum-producing means; a valve controlling communication of said receptacle with the atmosphere; a lever connecting said valves for seating each by the movement which unseats the other; a spring operatively connected with the lever exerting stress thereon in a general direction toward its fulcrum; a float in said receptacle, and means connecting the float with the spring for moving it at one end to shift the direction of its stress from one side to the other of the fulcrum.

13. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above that of said tank; a conduit leading from said tank to said receptacle; means for producing a partial vacuum in said receptacle above the liquid therein; a conduit leading from said receptacle for supplying liquid to the engine intake; a valve controlling communication between said receptacle and the partial vacuum-producing means; a valve controlling communication of said receptacle with the atmosphere; mechanism connecting said two valves for their simultaneous operation to close one when the other is opened and to open the first when the second is closed, said mechanism comprising a lever; means operatively connected with said lever exerting stress thereon which is directed generally toward the fulcrum of the lever; a float in said receptacle, and means connecting the float with said stress-exerting means to shift the stress from one side to the other of the lever fulcrum.

14. In combination with a main low-level liquid supply tank; a liquid supply receptacle located in a plane above said tank; an auxiliary receptacle into which the liquid flows from said first receptacle; a conduit leading from the auxiliary receptacle for discharge by gravity therefrom; means for producing a partial vacuum in said first receptacle; means for alternately connecting said first receptacle with said exhausting means and with the atmosphere; a check

valve which controls the communication between said first mentioned receptacle and said auxiliary receptacle, opening by pressure of the liquid in the first mentioned receptacle, and a pipe communicating with said auxiliary receptacle and extending to a point above the high liquid level in the first receptacle and open to atmospheric pressure, for maintaining atmospheric pressure in said supplemental receptacle.

In testimony whereof, I have subscribed my name.

WEBB JAY.

Witnesses:
GEO. L. WILKINSON,
HENRY A. PARKS.