May 19, 1925. 1,538,856

E. KNAUSS

CARBURETOR

Filed Jan. 16, 1920

Fig. 1.

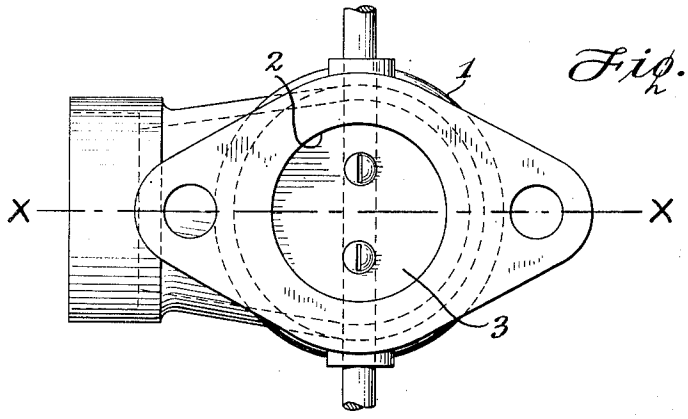
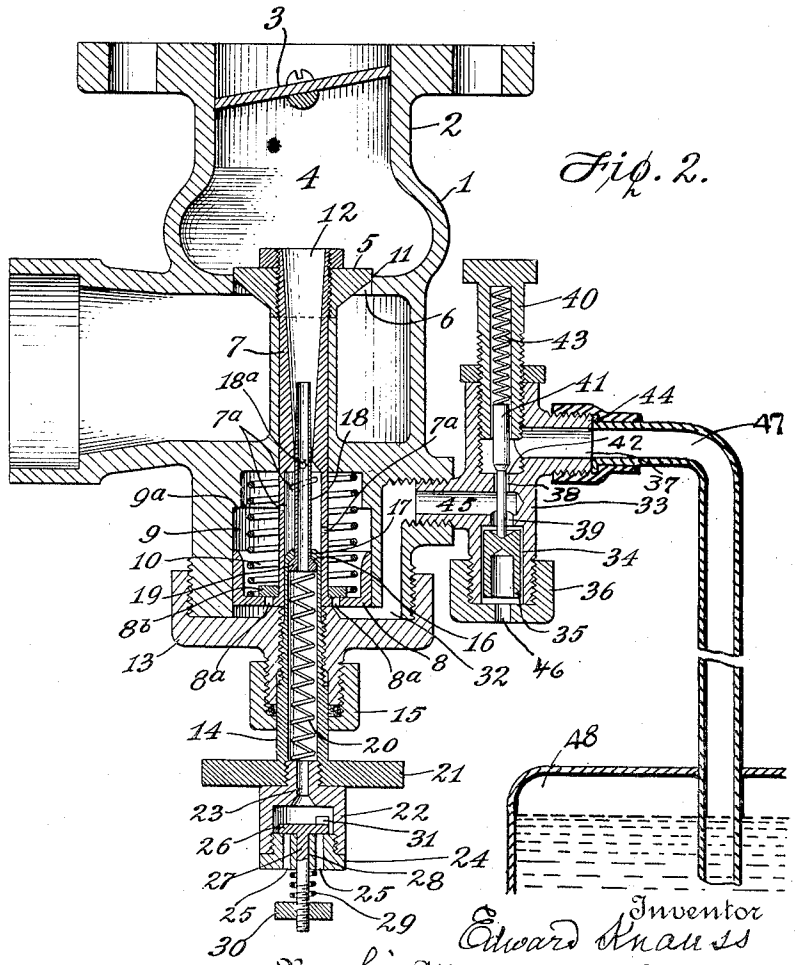


Fig. 2.



Inventor
Edward Knauss
By his Attorney
Henry M. Brigham

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UNITED STATES PATENT OFFICE.

EDWARD KNAUSS, OF MOUNT VERNON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO K. P. PRODUCTS COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CARBURETOR.

Application filed January 16, 1920. Serial No. 351,857.

To all whom it may concern:

Be it known that I, EDWARD KNAUSS, a citizen of the United States, residing at No. 493 Gramatan Avenue, Mount Vernon, in the county of Westchester and State of New York, have invented new and useful Improvements in Carburetors, of which the following is a specification.

Many carburetors heretofore in use have been necessarily supplied with a float feed chamber in which the liquid fuel was maintained at a constant level and from which the fuel was supplied to the fuel nozzle. Fuel was supplied to the float feed chamber either by gravity from a tank located above the float feed chamber by a vacuum tank which drew the fuel from the fuel tank and fed it by gravity to the float feed chamber, or by pressure feed which forced the fuel from the tank to the float feed chamber.

The object of my invention is to construct a carburetor which will draw the fuel directly from the fuel tank and to provide means whereby the rate at which the fuel is supplied by the fuel nozzle will not be increased or diminished by raising or lowering the level of the fuel in the fuel tank with reference to the fuel nozzle within the limits which the conditions of operation permit. To provide means for regulating the range or limit through which the fuel level in the fuel tank may be lowered with reference to the fuel nozzle without disturbing or changing the rate of fuel flow from the fuel nozzle and to provide means for automatically cutting off the flow of fuel to the fuel nozzle when the fuel level in the fuel tank is above the nozzle and the carburetor is not in operation.

The other objects of my invention will be more fully set forth in the following specification:

In the accompanying drawings Figure 1 is a plan view of my improved carburetor. Figure 2 is a sectional view on the line XX of Figure 1. Similar reference numerals refer to similar parts throughout the several views.

My carburetor is provided with a shell 1 in the outlet 2 of which is mounted a throttle valve 3 below which is a mixing chamber 4. A suction controlled valve 5 is adapted to open and close the air inlet 6. To the lower end of the tube 7 depending from and secured to the valve 5 is secured a piston 8 which is adapted to reciprocate in the cylinder 9 formed in the shell. A stop 9^a limits the movement of the piston 8 and of the valve 5. The piston 8 is provided with ports 8^a and the floating ring 8^b is adapted to cover and close these ports. The tube 7 is provided with the ports 7^a. A spring 10 tends to hold the valve 5 on its seat 11. The tube 7 is provided with a tapered central bore 12. A cap 13 is secured to the base of the shell 1, as shown. This cap 13 is tapped and threaded to receive the tube 14 which is longitudinally adjustable therethrough. The packing nut 15 serves to lock the tube 14 in position and prevents leakage of fuel around the tube. The upper end of the tube 14 is provided with a socket 16 and a centrally located opening 17. A tube 18 which is tapered toward the upper end is provided with a head 19 which seats in the socket 16. The tube 18 is pierced at 18^a and projects upwardly through the opening 17 and into the restricted portion of the tube 7. The tube is maintained in the position shown by the spring 20 which forces the head 19 into the socket 16. This construction permits the tube 18 to accurately line up in the restricted portion of the tube 7 and when in alignment it is maintained in the position shown by the spring 20.

The lower end of the tube 14 is screw threaded to receive the member 22 which is provided with an air port 23. The lower end of the member 22 is screw threaded to receive the valve seat 24 which is provided with air ports 25. The valve 26 is provided with a stem 27 which projects through the guide 28 in the valve seat 24. A spring 29 mounted on the stem 27 and held in position by the nut 30 tends to hold the valve 26 against the seat 24 in which position the valve 26 closes the ports 25. The energy of the spring may be adjusted by the nut 30. The valve 26 is provided with a stop 31 which limits the opening of the valve 26.

The ports 7^a are in open communication with the chamber 9 which is in open communication through the ports 8^a with the chamber 32 when the valve 8^b is lifted. The shell 1 is tapped and threaded to receive a

casting 33 in which is formed a cylinder 34 in which is mounted a piston 35 which is retained in the cylinder by the cap 36. The cap is provided with an air port 46.

The casting is provided with ports 37, 38 and 39. The casting is tapped and threaded to receive the chambered stud 40 in which is mounted a valve 41 which is normally held against the seat 42 by the spring 43 and is provided with a stem which projects through the ports 38 and 39 into the cylinder 34 immediately over the top of the piston 35 when the parts are at rest. The casting 33 is provided with a nipple 44 which is theaded so that it may be secured to a pipe 47 leading to the fuel tank 48. The casting 33 is also provided with a passage 45.

The operation of my carburetor is as follows:

In order to function satisfactorily the vacuum required to lift the valve 5 from its seat against the resistance of gravity and of the spring 10 must be considerably greater than the vacuum required to lift the piston 35 and open the valve 41 and the nut 30 should be preferably so adjusted that the vacuum required to lift the valve 26 from its seat will be considerably greater than the vacuum required to lift the piston 35 and open the valve 41 and slightly less than the vacuum required to lift the valve 5. When a sufficient vacuum is created in the chamber 4 by the movement of the piston or pistons of the engine the piston 35 is lifted carrying with it the valve 41 and fuel is drawn from the tank through the passages 42, 38 and 45, into the chamber 32 whence it passes through the ports 8^a into the cylinder 9 and through the ports 7^a into the tube 14 and through the port 18^a into the tube 18. At the same time the valve 26 is lifted from its seat and air passes through the ports 25 and around the piston 26 through the port 23, tube 24 and tube 18, and thence it passes through the bore 12 of the tube 7 into the mixing chamber 4 and past the valve 13 to the engine. As the capacity of the tube 18 is exceedingly small, the quantity of the mixture flowing to the chamber 4 is insufficient to substantially reduce the vacuum which rises until the valve 5 is lifted from its seat. As the tube 18 is tapered the lifting of the valve 5 and tube 7 leaves a space between the tube 18 and the constricted portion of the passage 12 through which fuel may flow from the cylinder 9 around the tube 18 and into the tapered passage 12, air being supplied to the mixing chamber 4, through the air intake passage 6 which is then partially open by the lifting of the valve 5. As the valve 5 is raised the vacuum in the chamber 4 is increased somewhat by the increased resistance of the spring 10, the taper of the tube 18 being such as to permit the correct amount of fuel to be supplied to the mixture through the port 18^a and through the space between the constricted portion of the passage 12 and the tube 18.

The operation of the piston 35 and the valve 41 is as follows: When the vacuum in the mixing chamber 4 is communicated through the various communicating ports to the chamber 45 and through the port 39 to the cylinder 34 the piston 35 is lifted carrying with it the valve 41. The valve 41 being then in the open position, the vacuum in the passage 45 is communicated to the passage 37 and the pipe 47, leading to the fuel tank 48 and causes the fuel to flow from the tank through the passages 37, 38 and 45 thereby reducing the vacuum in the fuel chamber 32, passage 45 and cylinder 34 until the piston tends to fall and the valve 41 to close thereby maintaining in the chamber 34, passage 45 and cylinder 34 during the operation of the carburetor a vacuum which is just sufficient to maintain the valve 41 in such a partially open position as to permit the amount of fuel which the vacuum draws from the chamber 32 to be replaced. It is apparent that the chambered stud 40 may be adjusted so as to regulate the vacuum necessary to lift the piston 35 and open the valve 41. When the valve 41 is lifted from its seat there is free open communication between the chamber 32, passages 45, 38 and 42 and the pipe leading to the fuel tank and the vacuum as regulated by the valve 41 is communicated to the passage 37 and the pipe leading to the fuel tank and is utilized for forcing the fuel from the tank to the nozzle. If the level in the fuel tank as compared with the level of the fuel nozzle is such that the vacuum required to lift the valve 41 is sufficient to force the fuel through the conduit leading to the nozzle the flow of fuel from the fuel nozzle will not be increased or decreased by raising or lowering the fuel level within this limit.

The piston 35 being independent mechanism which is acted upon by the vacuum between the valve 41 and the fuel nozzle, will be actuated to open the valve 41 whenever the vacuum is sufficient to overcome the weight of the piston and the valve 41 and the resistance of the spring 43 but the degree of opening of the valve 41 is influenced by the suction or pressure, as the case may be, existing in the fuel column on the supply side of the valve 41. If the fuel lift is great there will be a corresponding suction on the supply side of the valve 41 tending to open it, and will result in an actual opening of the valve 41 to a position that fuel may flow past the valve at a rate which will prevent the vacuum from rising above just that required to maintain the valve in that open position. On the other hand if there is pressure on the fuel in the conduit 37 it will act

to assist the spring 43 in opposing the pressure on the valve 41 exerted by the piston 34 and the valve 41 will therefore assume a more nearly closed position, the result being that the degree of suction in the chamber 45 remains substantially unchanged while the restriction to fuel flow past the valve 41 changes materially with the suction or pressure of the fuel in the passage 37.

It is also apparent that if the level of the liquid fuel in the tank is above the valve 41 that the action will be just as described except that the force then tending to cause the fuel to flow past the valve 41 will be increased and therefore the valve 41 will not be lifted so far from its seat in order to permit a given quantity of fuel to pass the valve in a given time and thereby reduce the vacuum in the cylinder 34 to the vacuum required to lift the piston 35 and open the valve 41.

It is also evident that when the carburetor is not in action the piston 35 will fall and the valve 41 will seat and cut off any flow of liquid fuel past said valve.

Having described my invention, I claim:

1. A carburetor comprising in combination a fuel nozzle, a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of liquid fuel through said conduit, automatic means for closing said valve when the carburetor is not in action and opposing automatic means actuated by the vacuum in the conduit between said nozzle and said valve adapted to open said valve to varying degrees against the resistance of the first mentioned automatic means, the degree of opening of said valve being in part controlled by the height of the column of fuel between said source of liquid fuel supply and said valve.

2. A carburetor comprising in combination a fuel nozzle, a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of fuel through said conduit, a spring adapted to close said valve when the carburetor is inactive, and opposing automatic means actuated by the vacuum in said conduit between said nozzle and said valve adapted to open said valve to varying degrees against the resistance of said spring.

3. A carburetor of the type which lifts liquid fuel by suction from a source of supply below the level of the fuel nozzle comprising in combination a fuel nozzle, a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of fuel through said conduit, a spring adapted to completely close said valve when the carburetor is inactive and resist the opening movement of said valve, opposing automatic means actuated by the vacuum in said conduit between said nozzle and said valve adapted to open said valve against the resistance of said spring and means for regulating the resistance of said spring.

4. A carburetor comprising in combination a fuel nozzle, a conduit leading from said nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of liquid fuel through said conduit, automatic means for closing said valve, a cylinder and a piston mounted to reciprocate in such cylinder and adapted to be actuated by the vacuum in said conduit between said nozzle and said valve and open said valve against the resistance of the automatic means for closing said valve.

5. A carburetor comprising in combination a fuel nozzle, a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of fuel through said conduit, a spring adapted to close such valve, a cylinder and a piston mounted to reciprocate in such cylinder and adapted to be actuated by the vacuum in said conduit between said nozzle and said valve and open said valve against the resistance of said spring.

6. A carburetor comprising in combination a fuel nozzle, a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of fuel through said conduit, a spring adapted to close such valve and resist the opening movement of such valve, means for regulating the resistance of such spring, a cylinder and a piston mounted to reciprocate in said cylinder and adapted to be actuated by the vacuum in said conduit between said nozzle and said valve and open said valve against the resistance of said spring.

7. A carburetor comprising in combination a throttle, a mixing chamber anterior to said throttle, a fuel discharge port discharging into said mixing chamber, a conduit leading from said port to a source of liquid fuel supply, a valve which cuts off the flow of liquid fuel through said conduit when the carburetor is inactive and suction operated means automatically variably operable responsive to the height of the fuel column between said discharge outlet and said source of liquid fuel supply for unseating said valve when the carburetor is functioning and for proportionately enlarging the fuel opening past said valve when the level of the source of fuel supply is lowered with respect to said discharge port and for proportionately decreasing the fuel opening past said valve when the level of the source of fuel supply is raised with respect to said discharge port.

8. A carburetor of the type that lifts by suction liquid fuel from a source of supply below the level of the carburetor's fuel discharge outlet comprising in combination a mixing chamber, a conduit leading from a

source of liquid fuel supply and discharging through a discharge outlet into said mixing chamber, a valve located between said discharge outlet and said source of liquid fuel supply, means operated by the suction in said conduit adapted to variably open said valve, to maintain a substantially constant reduction of pressure in said conduit between said valve and said discharge outlet through wide variations in the height of the fuel column between said discharge outlet and said low level source of liquid fuel supply.

9. A carburetor of the type that lifts by suction liquid fuel from a source of supply below the level of the carburetor's fuel discharge outlet comprising in combination a mixing chamber, a conduit leading from a source of liquid fuel supply and discharging through a discharge outlet into said mixing chamber, a valve located between said discharge outlet and said source of liquid fuel supply, means operated by the suction in said conduit adapted to variably open said valve, to maintain a substantially constant reduction of pressure in said conduit between said valve and said discharge outlet through wide variations in the height of the fuel column between said discharge outlet and said low level source of liquid fuel supply and manual means for adjusting the degree of depression in said conduit between said valve and said fuel discharge outlet.

10. A carburetor comprising in combination a fuel nozzle a conduit leading from said fuel nozzle to a source of liquid fuel supply, a valve adapted to cut off the flow of liquid through said conduit, automatic means for closing said valve when the carburetor is not in action and opposing automatic means actuated by the vacuum in the conduit between said nozzle and said valve adapted to open said valve against the resistance of the automatic means for closing said valve, the degree of opening of said valve being conjointly controlled by the engine fuel demand and by the height of the column of fuel between said source of liquid fuel supply and said valve.

11. A carburetor of the type that lifts by suction liquid fuel from a source of supply below the level of the carburetor's fuel discharge outlet comprising in combination a mixing chamber, a conduit leading from a source of liquid fuel supply and discharging through a discharge outlet into said mixing chamber, a valve located between said discharge outlet and said source of liquid fuel supply, means operated by the suction in said conduit adapted to variably open said valve, to maintain a substantially constant reduction of pressure in said conduit between said valve and said discharge outlet through wide variations in the height of the fuel column between said discharge outlet and said low level source of liquid fuel supply and through wide variations in engine fuel demand.

12. A carburetor comprising, in combination, a mixing chamber, an automatic air valve restricting the flow of air into said mixing chamber to maintain a suction therein during the operation of the engine to which the carburetor is attached, a fuel port delivering into said mixing chamber, a source of fuel supply the level of which varies both above and below said fuel port, a variable valve in the fuel passage between said source and said port, and means operated by suction derived from said mixing chamber and existing between said valve and said port for controlling the position of said valve to assist in maintaining a delivery of fuel which changes for each change in position of said air valve but which is constant for each position of said air valve regardless of changes in the relative heights of said source of supply and said port.

13. A carburetor comprising, in combination, a mixing chamber, an automatic air valve restricting the flow of air into said mixing chamber to maintain a suction therein during the operation of the engine to which the carburetor is attached, a fuel port delivering into said mixing chamber, a source of fuel supply the level of which varies both above and below said fuel port, a variable valve in the fuel passage between said source and said port, and means operated by suction derived from said mixing chamber and existing between said valve and said port for maintaining said valve in such varying open positions that a constant proportional supply of fuel may pass to said valve port for each position of said air valve regardless of changes in the relative heights of said source of supply and said port.

14. In a fuel lifting carburetor, a fuel discharge outlet, a fuel supply tank located normally at a lower level than said outlet but subject to variation of such level, a supply conduit extending between said outlet and said tank, a valve in said conduit for controlling the amount of fuel delivered to said discharge outlet, said valve being conjointly controlled by the suction on said port and by the head of fuel between said port and said tank to provide a varying restriction to the flow of fuel through said conduit whereby a uniform delivery from said port will be maintained under fixed suction conditions upon the discharge outlet regardless of changes in the fuel head between the discharge outlet and the fuel tank.

15. In a vacuum feed carburetor, the combination of a casing having an air passageway, a fuel discharge port emptying into the passageway, a low level source of fuel sup-

ply, a conduit connecting said source and said discharge port, a valve for regulating the flow of fuel through said conduit, and means operated by the suction between said valve and said port and regulated by the height of the fuel lift for controlling the degree of opening of said valve.

16. In a vacuum feed carburetor, the combination of a casing having an air passageway, a fuel supply source at a lower level, a fuel discharge port emptying into the air passageway, a fuel conduit from the low level source to said fuel discharge port, a valve for regulating the flow of fuel through said fuel conduit, a chamber included in the passageway between said valve and said discharge port, a movable wall for said chamber connected with said valve, said chamber being maintained under suction during the operation of the carburetor for lifting fuel from the low level source to the level of the carburetor, the degree of opening of said valve depending upon the degree of fuel lift and the engine demand.

17. In a fuel lifting carburetor, the combination with a casing having an air passageway, an air intake valve for automatically maintaining variable degrees of suction in said passageway depending upon the engine demand, a fuel discharge port emptying into said passageway on the engine side of said valve and subject to the suction therein as regulated by said air valve, a low level source of fuel supply, a conduit from said source to said discharge port, and means operated by suction derived from said air passageway and responsive to the conjoint effect of the suction on said port and the suction produced in said conduit by the height of the fuel lift for preventing changes in fuel lift from altering the various quantities of fuel discharged from said port for various positions of said air valve.

January 14, 1919.

EDWARD KNAUSS.

Witnesses:

PAUL R. JAMES,

ALICE M. DAVISON.