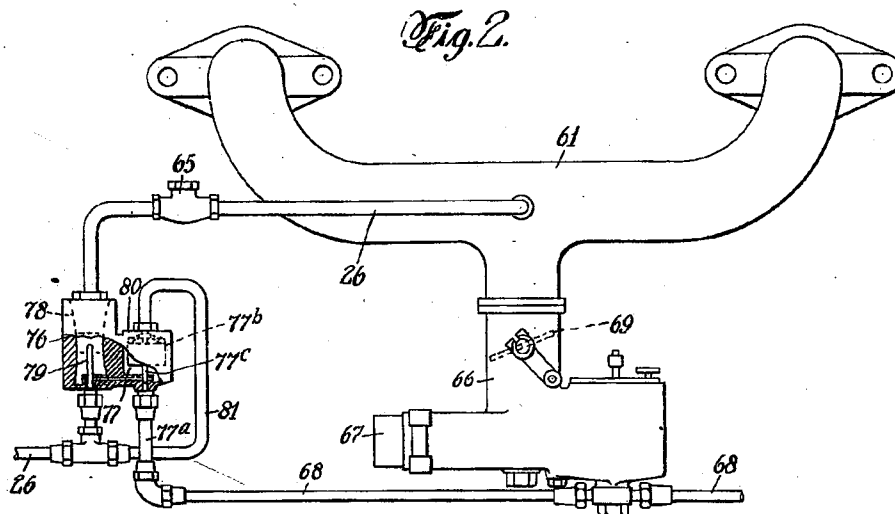
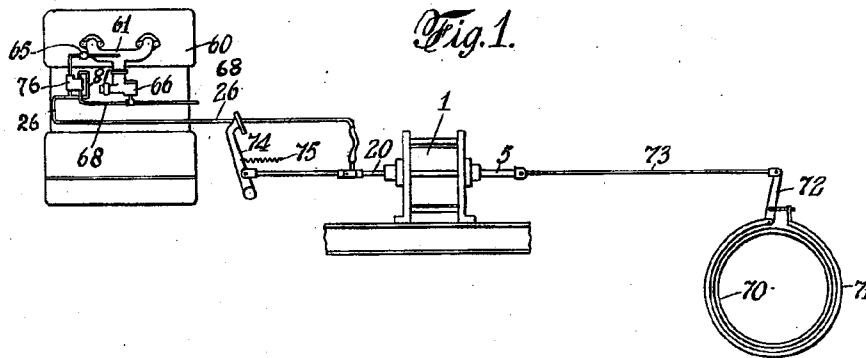


Nov. 12, 1929.

C. S. BRAGG ET AL.

1,735,631

APPARATUS FOR OPERATING SUCTION ACTUATED DEVICES IN CONNECTION
WITH THE SUCTION PASSAGE OF AN INTERNAL COMBUSTION ENGINE
Original Filed Feb. 26, 1925



Caleb S. Bragg
Victor W. Whitaker
Louis Newell Whitaker
INVENTORS
ATTORNEY

UNITED STATES PATENT OFFICE

CALEB S. BRAGG, OF PALM BEACH, FLORIDA, AND VICTOR W. KLIESRATH, OF PORT WASHINGTON, NEW YORK, ASSIGNORS TO BRAGG-KLIESRATH CORPORATION, OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF NEW YORK

APPARATUS FOR OPERATING SUCTION-ACTUATED DEVICES IN CONNECTION WITH THE SUCTION PASSAGE OF AN INTERNAL-COMBUSTION ENGINE

Original application filed February 26, 1925, Serial No. 11,683. Divided and this application filed June 11, 1926. Serial No. 115,162.

Our invention consists in the novel features hereinafter described, reference being had to accompanying drawing, which illustrates an embodiment of the same selected by us for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

This application is a division of our previous application for Letters Patent of the United States, filed February 26, 1925, and given Serial No. 11,683.

In the operation of vacuum brakes for automotive vehicles, it is extremely convenient to obtain the necessary suction or partial vacuum from a suction passage of the internal combustion engine, ordinarily employed for the propulsion of the vehicle, and located between the throttle valve for controlling the supply of mixture, and the cylinder. To this end it is convenient and desirable to connect the vacuum brake mechanism with the intake manifold of the engine. It will be understood, further, that all of the air exhausted from the brake actuating mechanism and delivered into the intake manifold of the engine necessarily has a tendency to either prevent the drawing in of the proper quantity of liquid fuel from the atomizer by reduction of the partial vacuum in the suction passage, or to dilute the explosive mixture passing through the suction passage, and such dilution may in some instances bring about a mixture which will not readily ignite in the engine. In either case the engine, if turning over idly, would be likely to stall and the admission of air into the manifold in this manner, may also materially delay the starting of the engine. For the proper operation of the vacuum brake mechanism of the vehicle, it is desirable that the air exhausted into the manifold shall be withdrawn from the brake actuating mechanism as rapidly as possible in order to insure quick operation of the brake mechanism, and if the connection between the brake actuating mechanism and

the intake manifold is restricted for the purpose of avoiding the stalling of the engine, and delay in starting, the result will materially retard the operation of the brake mechanism.

In carrying our invention into effect we provide the suction pipe or passage leading from the suction actuated device to the suction passage of the engine, and connected thereto between the throttle valve and the engine cylinders, with a fuelizing or carbureting means, located between the valve mechanism of the actuator and the suction passage, and entirely separate in its operation from the main or engine carburetor which furnishes explosive charges to the cylinders under normal operation at all speeds and under the control of the throttle valve. This separate fuelizing or carbureting means is provided with a jet nozzle discharging into the suction pipe or passage and supplied from a float chamber provided with a liquid fuel level control valve and float operatively connected therewith, and means are provided for equalizing the pressures in the float chamber above the liquid therein and in the suction pipe adjacent to the discharge orifice of the nozzle to prevent the discharge of liquid fuel into the suction pipe, except when air is actually passing from the suction actuated device to the suction passage of the engine, at which time the liquid fuel will be delivered to said air to carburet it. This separate fuelizing or carbureting means is thus automatically responsive only to conditions arising in the suction pipe and due to the operative or inoperative condition of the suction actuated device, and is in no sense a part of or an adjunct to the main or engine carburetor, although it may, in some instances, be supplied with liquid fuel therefrom or from the source of supply.

In the form of our invention, which forms the subject matter of this application, we provide a separate carburetor located in the

connection between the vacuum brake actuating mechanism and the intake manifold operating independently of the main or engine carburetor, the ordinary check valve being provided in said connection preferably between the separate carburetor and the intake manifold, the separate carburetor being conveniently supplied with liquid fuel from the main fuel supply pipe or the main carburetor, and means being provided for equalizing the pressure on the surface of the fuel in the float chamber of the separate carburetor, and that in the connecting pipe or passage between the brake actuating mechanism and the manifold, in order to prevent flooding and to insure that there will be no feed of fuel by the separate carburetor, except when air is being withdrawn from the brake actuating mechanism.

In the accompanying drawing,

Fig. 1, is a diagrammatic view, showing an installation in an automotive vehicle comprising an internal combustion engine, brake mechanism for the vehicle, and a vacuum operated power actuator for the brake mechanism, and having our present invention embodied therein.

Fig. 2, is an enlarged view of certain parts illustrated in Fig. 1, showing the intake manifold, the main carburetor connected therewith, and the separate carburetor in the suction line from the intake manifold to the power actuator for the brake mechanism.

In Fig. 1, we have illustrated our invention applied in connection with an automotive vehicle propelled by an internal combustion engine, and having a vacuum or suction operated device for operating the brake mechanism of the vehicle. In this figure, 1, represents the cylinder of a power actuator of the kind illustrated in our former application for Letters Patent of the United States, Serial No. 11,683, of which this application is a division, and also illustrated in our former application for Letters Patent of the United States, filed November 2, 1924, Serial No. 751,481. As the specific construction of the power actuator has no bearing on our present invention, it will not be particularly described herein. It will be understood, that, the cylinder is provided with a piston, (in this instance a double acting piston), connected with a piston rod, 5, which is in turn connected by a link, 73, to a brake lever, 72, for operating an ordinary brake mechanism diagrammatically indicated in Fig. 1, and comprising in this instance a brake band, 71, and brake drum, 70, so that the movement of the piston in one direction applies the brake, and in the opposite direction releases the brake. It will also be understood, that the actuator is provided with reversing valve mechanism which may be conveniently located in the hub of the piston, and which is operated by a longitudinally movable valve

actuating sleeve, 20, extending therethrough and projecting from the opposite end of the cylinder from the piston rod, 5, through a suitable stuffing box, said valve mechanism being so constructed as to place one end of the cylinder in communication with the suction line to the intake manifold of the engine, and the other end of the cylinder in communication with the atmosphere, and vice versa, according as the valve actuating sleeve is moved in one direction or the other. The valve sleeve, 20, is operatively connected with a foot lever or other operator operated device indicated at 74, provided with a retracting spring, 75. The specific details hereinbefore referred to are clearly set forth in the prior applications above noted, and as they form no part of our present invention, they will not be more particularly described herein. 66, represents the main carburetor having the main air intake, 67, and fuel supply pipe, 68. 69, represents the usual throttle valve of the engine.

In Fig. 2, we have illustrated an enlarged view of the intake manifold, 61, and adjacent parts, and have shown the specific embodiment of our invention which forms the subject matter of this application, whereby the air withdrawn from the actuator is mixed with liquid fuel to form an explosive mixture, but it enters the intake manifold for the purpose of preventing the dilution of the explosive charge, and interference with the operation of the engine, as before set forth.

As shown in the drawings, the suction pipe, 26, extends from a portion of the suction passage between the throttle valve and the engine cylinder, as the intake manifold, 61, of the internal combustion engine, 60, to the power actuator, in this instance having a flexible portion connected to the valve mechanism of the actuator through the hollow valve actuating sleeve, 20. The suction pipe, 26, is provided with a check valve, 65, and is also provided with a separate carburetor indicated at 76 located between the valve mechanism of the actuator and the suction passage of the engine, which in this instance is provided with the float chamber, 77, having the usual float, 77^b, controlling the usual float valve, 77^c. The float chamber, 77, is connected by a pipe, 77^a, with the gasoline feed pipe, 68, which in this instance supplies the float chamber of the main carburetor also, and the separate carburetor is provided with the usual Venturi pipe, 78, connected in the suction line pipe, 26, at both ends, and provided with the usual jet or atomizing nozzle, 79, communicating with the float chamber, 77, below the float, 77^b, and having its discharge aperture above the liquid level in the float chamber, 77, indicated in dotted lines. Whenever air is withdrawn from the actuator by suction of the manifold, such air will be mixed with atomized liquid fuel in

the Venturi pipe, and will pass on through the check valve, 65, into the manifold as combustible mixture, and will there mix with the combustible mixture passing through the main carburetor, 66, in the ordinary way.

In order to prevent the gasoline from being forced through the jet, 79, into the pipe, 26, by atmospheric pressure on the liquid in the float chamber, 77, when the air in the pipe, 26, has been exhausted by the partial vacuum in the intake manifold, which degree of rarefaction is constantly maintained in the pipe, 26, by the check valve, and when no air is flowing through the pipe, 26, it is desirable to equalize the pressure above the liquid in the float chamber, 77, and that in the pipe, 26. For this purpose we provide in this instance, an air tight cover, 80, for the float chamber, 77, and connect the float chamber above the liquid level by a branch pipe, 81, with the pipe, 26, as shown, so that the presence of any rarefaction or varying conditions of rarefaction in the pipe 26, will be accompanied by a similar condition above the liquid in the float chamber, and no liquid fuel will be forced by unequal pressures through the atomizing nozzle. We prefer to connect the equalizing pipe, 81, to the top of the float chamber, 77, immediately over the float. When air is drawn from the actuator through the suction pipe, 26, and through the auxiliary carburetor, there will naturally be a decrease in the degree of rarefaction within the suction pipe and separate carburetor, or in other words, an increase of pressure. This increase of pressure will be felt first by the discharge orifice of the nozzle, 79, of the carburetor, and an appreciable instant later in the float chamber, where it will cause a slight depression of the float, 77^b, thereby exerting a slight downward pressure on the liquid, which will impel the liquid fuel toward the nozzle, and thus overcome any tendency of such increase of pressure to hold or drive the liquid back from the discharge orifice of the nozzle, which might otherwise result. By means of the apparatus herein shown and described, it will be seen that the air withdrawn from the suction actuated device, by the suction in the intake manifold, when the suction actuated device is operated, will be carbureted by the auxiliary carburetor on its way to the suction passage of the engine, and will enter the suction passage as explosive mixture, and combine readily with the normal charges of explosive mixture passing from the main carburetor to the engine, so that there will be no danger of interfering with the operation of the engine, or of stalling it if idling, or delaying the starting of the engine through the operation of the suction actuated device. While we have shown our invention embodied in a brake mechanism, it will be obvious that it is applicable to any installation in which a suction actu-

ated device is employed for any purpose, and in which it derives its suction from the suction passage of an internal combustion engine.

It will be seen that the separate carburetor is at all times subjected to the maximum degree of rarefaction in the suction passage of the engine, and the check valve normally maintains in the suction connection and said separate carburetor, the maximum degree of rarefaction collected in the suction passage at any time between operations of the brake mechanism, and according to our invention, we prevent the discharge of liquid fuel into the suction connection when the rarefaction is maximum, and permit it only when the air is actually passing from the actuator to the suction passage, at which time the rarefaction in the suction connection and separate carburetor approaches the minimum.

What we claim and desire to secure by Letters Patent is:—

1. The combination with an internal combustion engine provided with a suction passage, an engine carburetor communicating therewith for supplying the normal charges for the engine at all speeds, and a throttling valve for said passage located between the carburetor and the engine cylinder, of a suction actuated device, an air connection extending therefrom to said suction passage, between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection between the valve mechanism of the suction actuated device and the suction passage and subjected at all times to the maximum rarefaction in said suction passage, means for supplying fuel to said carburetors, said separate carburetor having an air tight float chamber, a float and liquid fuel level control valve connected therewith, and means for equalizing the pressures in the said float chamber above the liquid therein and in the said air connection to prevent the discharge of liquid from said separate carburetor at all times except when air is flowing through said air connection from the operation of the suction actuated device, to fuelize said air and prevent the engine from stalling if idling.

2. The combination with an internal combustion engine, provided with a suction passage, an engine carburetor communicating therewith for supplying the normal charges for the engine at all speeds, a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom and connected to said suction passage, between the said throttle valve and cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection between the valve mechanism of the suction actuated device and

the suction passage and subjected at all times to the minimum rarefaction in said suction passage, means for supplying fuel to said carburetors, said separate carburetor having an air tight float chamber, a float and liquid fuel level control valve connected therewith, said float chamber being provided above the liquid level therein with an equalizing passage connected with said air connection to prevent the discharge of liquid from said separate carburetor at all times except when air is flowing through said air connection from the operation of said suction actuated device, to fuelize said air and prevent the engine from stalling if idling.

3. The combination with an internal combustion engine, provided with a suction passage, an engine carburetor communicating therewith for supplying the normal charges for the engine at all speeds, a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom and connected to said suction passage between said throttle valve and cylinders, a separate carburetor operating independently of the engine carburetor, located in said air connection, between the valve mechanism of the suction actuated device and the suction passage, means for supplying fuel to said carburetors, said separate carburetor having an air tight float chamber, a float and liquid fuel level control valve connected therewith, said float chamber being provided above the liquid level therein with an equalizing passage connected to the float chamber above the float therein and connected to said connection to prevent the discharge of liquid from said separate carburetor at all times except when air is flowing through said air connection from the operation of the suction actuated device to fuelize said air and prevent stalling the engine if idling, said separate carburetor being provided with a jet nozzle connected with said float chamber below the float, and discharging above the liquid fuel level in the float chamber into said air connection.

4. The combination with an internal combustion engine, provided with a suction passage, an engine carburetor communicating therewith, for supplying the normal charges for the engine at all speeds, and a throttle valve for said passage, located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom to said suction passage between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection, between the valve mechanism of the suction actuated device and the suction passage, and subjected at all times to the maximum rarefaction in said suction passage, means for supplying fuel to said car-

buretors, said separate carburetor being provided with an air tight float chamber, a float, and a liquid fuel level controlling valve connected therewith, and means for venting the float chamber into said air connection to prevent the discharge of liquid fuel from said separate carburetor at all times except when air is flowing through said air connection from the operation of the suction actuated device, to fuelize said air and prevent the engine from stalling if idling.

5. The combination with an internal combustion engine provided with a suction passage, an engine carburetor connected therewith, and a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom to said suction passage between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor, located in said air connection, between the valve mechanism of the suction actuated device and the suction passage, and subjected at all times to the maximum rarefaction in the suction passage, means for supplying fuel to said carburetors, said separate carburetor being provided with an air tight float chamber, a float, and a liquid fuel level controlling valve connected therewith, and means for establishing communication between the float chamber for said separate carburetor above the liquid fuel level therein and the suction passage of the engine, whereby fuel will be drawn into the float chamber of the separate carburetor under the control of the liquid fuel level controlling valve, by the suction in said suction passage, when the throttle valve is closed, and the power actuator is not in use, and whereby the discharge of fuel from said separate carburetor is prevented at all times except when air is passing through said air connection from the suction actuated device to said suction passage.

6. The combination with an internal combustion engine provided with a suction passage, an engine carburetor communicating therewith for normally supplying the charges for the engine at all speeds, and a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom to said suction passage between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection between the valve mechanism of the suction actuated device and the suction passage, and subjected at all times to the maximum rarefaction in the suction passage, means for supplying fuel to said carburetor, said separate carburetor having an air tight float chamber, a float and liquid fuel level control valve connected therewith, said float chamber being provided above the liquid

level therein with an equalizing passage, connected to the float chamber above the float therein and connected to said air connection, said separate carburetor being provided with a jet nozzle connected with said float chamber below the float, and discharging above the liquid fuel level in the float chamber into said air connection, and said equalizing passage being connected to the air connection adjacent to said jet nozzle, whereby the changes in the degree of rarefaction in said air connection affect the pressures above the liquid fuel in said nozzle, and in said float chamber similarly, and the discharge of fuel into said air connection is prevented at all times except when air is passing there-through from the suction actuated device to said suction passage of the engine.

7. The combination with an internal combustion engine provided with a suction passage, an engine carburetor communicating therewith for normally supplying the charges for the engine at all speeds, and a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom to said suction passage between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection, means for supplying fuel to said carburetors, said separate carburetor between the valve mechanism of the suction actuated device and the suction passage subjected at all times to the maximum rarefaction in the suction passage, and having an air tight float chamber, and a float and liquid fuel level control valve connected therewith, said float chamber being provided above the liquid level therein with an equalizing passage, connected to the float chamber above the float therein and connected to said air connection, said separate carburetor being provided with a jet nozzle connected with said float chamber below the float, and discharging above the liquid level in the float chamber into said air connection, and said equalizing passage being connected with said air connection between said jet nozzle and the suction actuated device, through said air connection, whereby the discharge of fuel from said nozzle is prevented except when air is being withdrawn from said suction actuated device and when air is being so withdrawn the degree of rarefaction within the float chamber will be reduced, and the pressure therein raised before it is reduced at the jet orifice, thereby tending to force the fuel out of the jet nozzle into the air passing through said air connection, to fuelize said air and prevent the stalling of the engine if idling.

8. The combination with an internal combustion engine provided with a suction passage, a carburetor communicating therewith,

a suction actuated device, a continuously open suction connection extending from the controlling valve mechanism of the suction actuated device to the carburetor, liquid fuel supplying means for said carburetor, said carburetor being provided with a closed float chamber connected with said fuel supplying means, a liquid fuel level control valve and a float operatively connected therewith, and an equalizing passage connecting the float chamber above the liquid level therein with said suction connection, whereby the air passing through said suction connection from the suction operated device to the suction passage of the engine will be fuelized and flooding of said carburetor is prevented.

9. The combination with an internal combustion engine provided with a suction passage, a carburetor communicating therewith, a suction actuated device, a continuously open suction connection extending therefrom to the carburetor, said suction actuated device comprising a cylinder and piston, and valve mechanism controlling communication between said cylinder and the said suction connection and the atmosphere, means for supplying liquid fuel to said carburetor, said carburetor being provided with a closed float chamber, connected with said fuel supplying means, a liquid fuel level control valve, and a float operatively connected therewith, and an equalizing chamber connecting the float chamber above the liquid level therein with said suction connection, whereby the air passing from said suction actuated device to the suction passage of the engine will be fuelized and flooding of the said carburetor is prevented.

10. The combination with an internal combustion engine provided with a suction passage, an engine carburetor communicating therewith for supplying the normal charges for the engine at all speeds, a throttle valve for said passage located between the carburetor and the engine cylinders, of a suction actuated device, an air connection extending therefrom and connected to the suction passage between the throttle valve and the engine cylinders, a separate carburetor operating independently of the engine carburetor located in said air connection between the valve mechanism of the suction actuated device and the suction passage and subjected at all times to the maximum rarefaction in said suction passage, means for supplying fuel to said carburetors, said separate carburetor having an air tight float chamber, a float and liquid fuel level controlling valve connected therewith, said float chamber being provided above the liquid level therein with an equalizing passage connected with said air connection to prevent the discharge of liquid from said separate carburetor at all times except when air is flowing through said air connection from the operation of the suction

actuated device, to fuelize said air and prevent the engine from stalling if idling, and a check valve interposed between said separate carburetor and the suction passage of the engine for maintaining in said suction connection and said separate carburetor the maximum degree of rarefaction created in the suction passage between operations of the suction actuated device.

In testimony whereof we affix our signatures.

CALEB S. BRAGG.
VICTOR W. KLIESRATH.