

H. DOCK.
CARBURETER.

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1,040,528.

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Fig. 1.

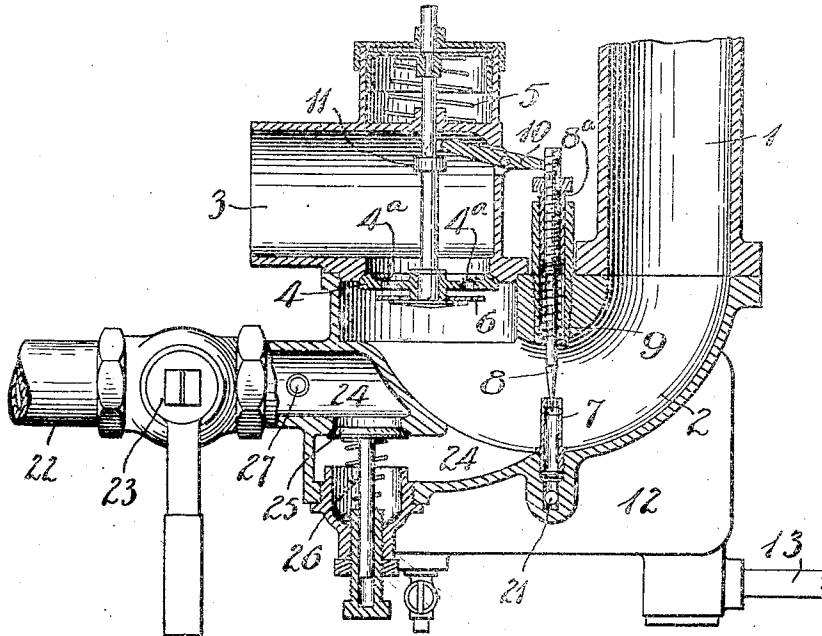


Fig. 2.

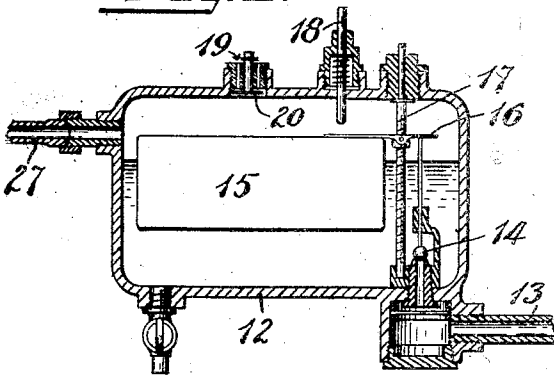
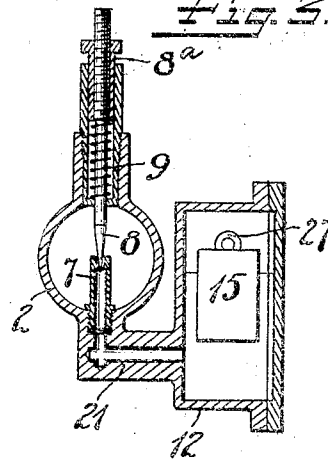


Fig. 3.



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CARBURETER.

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To all whom it may concern:

Be it known that I, HERMAN DOCK, a citizen of the United States, residing at Westerly, county of Washington, Rhode Island, have invented certain new and useful Improvements in Carbureters, of which the following is a full, clear, and exact description.

My invention relates to improvements in so-called carbureters, which I will term herein a "differential-pressure" carbureter, the purpose of the same being to provide an improved construction whereby air at atmospheric pressure may be admitted through the carbureter, or air under a pressure heavier than atmosphere may be forced through said carbureter, the fuel supply being taken up by the air in either instance in a proper proportion to mingle therewith in such manner as to produce a uniform mixture.

This invention has particular value when used in connection with an engine such as set forth in my former Patent No. 831,044, of September 18, 1906, in which the starting of the engine is effected by forcing a charge of gas under pressure into the cylinder, for the purpose of advancing the piston on one power stroke, a portion of said charge being relieved on the return stroke, the remaining portion being re-compressed and fired on the next advance stroke, the burned gas being expelled by the following return stroke of the piston, and so on. My invention aims at simplicity, effectiveness, durability, certainty and uniformity of action under these varying conditions.

In the accompanying drawings Figure 1 is in the main a sectional view of my carbureter, certain parts being shown in elevation. Fig. 2 is a sectional view of the fuel reservoir or "float-can", so-called. Fig. 3 is a sectional view of said "float-can", taken at right angles to the section of Fig. 2, and also showing in section a portion of the main body of the carbureter.

1 represents that part of the carbureter which leads to the engine.

2 is the goose-neck.

The parts 1 and 2 constitute a duct.

3 is an inlet open to atmosphere. 4 is a check valve therein, the tension of which is adjustably governed by a spring 5. This check valve 4 has normally open restricted air ports 4^a, which may be closed by back

pressure through the medium of a secondary check valve 6.

7 is the fuel nozzle located in the goose-neck and controlled by a needle valve 8. The needle valve is adjustably mounted in a suitable sliding sleeve 8^a so that when adjusted a proper opening is provided at the outlet end of the nozzle 7 for starting. A spring 9 tends to lift the sleeve portion of the needle valve 8 to open said nozzle still wider.

10 is a lever engaging at one end with the needle valve sleeve and at the other end with a collar 11 on the stem of the check valve 4.

Assuming the springs 9 and 5 are properly proportioned and adjusted, and the motor is being started or is running slowly, drawing, for example, a predetermined amount of air through the goose-neck past the jet, the valve 4 will assume a predetermined position effected by adjustment, such, for example, as indicated in Fig. 1. The spring 5, being stronger than spring 9, serves to not only keep the valve 4 against its seat, but also (through lever 10) to hold the needle valve 8 at said predetermined adjustment. As soon as an increased demand for mixture is made, this is supplied by suction around the valve 4, which then opens sufficiently to supplement the air through the ports 4^a. As the check valve 4 is unseated and opens, the spring 9 opens the valve 8 to such an extent as is permitted by lever 10, which latter is permitted to rock back by the opening of valve 4.

Fuel is maintained in the nozzle 7 at a uniform level by means of a constant level in fuel tank or "float-can" 12, to which tank fuel is supplied through pipe 13 controlled by valve 14 operated by the float 15 through the medium of a hinge lever 16. The bearing of the hinged lever 16 is mounted upon an adjustable stem 17, whereby the height of the fulcrum thereof may be varied and the normal level of the fuel in the tank 12 correspondingly varied.

18 is a spring-pressed plunger normally retracted and so arranged relatively to the float that by pressing down upon said plunger the float may be depressed, the valve 14 opened, and the carbureter flooded to any desired extent.

The float-can 12 is normally open to at-

mosphere through vent 19, while 20 is a check valve arranged to close said vent when a greater pressure occurs within the float-can than outside of the same. Fuel within the float-can is conducted to the jet nozzle 7 through pipe 21.

22 is a pipe leading to a source of compressed air and having a valve 23 of suitable form therein. This pipe I will term the "compressed air line." This line pipe 22 communicates with the duct in which the fuel nozzle stands through passage 24, a check valve 25 being provided therein. The check valve may be regulated by a spring 26, which spring operates to normally close said valve. When the valve 23 is opened, compressed air will be forced in, opening check valve 25 against the action of spring 26, so that said compressed air will flow freely through passage 24 into the goose-neck 2 and past the jet nozzle 7, taking up fuel therefrom as the requirements demand.

27 is an air duct or by-pass leading from passage 24 to the interior of float-can 12. This air duct 27 preferably taps into the passage 24 at a point between the check valve 25 and valve 23.

From the foregoing the operation will be seen to be as follows: When the float-can is filled to the proper level with fuel, this level will be maintained by gravity at the nozzle 7. When it is desired to start the engine, compressed air is let in by opening the valve 23. This immediately opens valve 25, so as to permit air to flow past the fuel nozzle, as first described, picking up the proper amount of fuel so as to form a mixture to be delivered through pipe 1 to the motor. The relatively high pressure of the compressed air in the goose-neck 2 serves to automatically close the check valves 4 and 6 (should either or both of them be open) thereby preventing escape of compressed air to atmosphere. To prevent forcing down the level of fuel in the nozzle by the presence of compressed air, this same pressure is maintained upon the fuel in the float-can by reason of the by-pass 27. As soon as the engine has started and gained sufficient momentum, the valve 23 may be closed, whereupon valve 25 closes. When this happens, air will be drawn in through inlet 3 and past valve 6. If the engine is running rapidly, the demand for air may be such as to open check valve 4, in which event, as above described, the needle valve 7 will be opened to a relatively corresponding extent to supply the desired added amount of fuel to maintain the proper proportion of air and fuel in the mixture.

The check valve 24 not only performs the function of a back-pressure valve, as already described, but performs a second and very important function during the starting of the engine incidental to the use of com-

pressed air. This function is as follows: When air, entering through valve 23, encounters the check valve 25, it must of necessity force said valve open and hold it open so long as compressed air is to be passed through the goose-neck 2. Inasmuch as the compressed air approaching the valve 25 must first perform the work of opening said valve, it follows there is a slightly greater pressure in that part of the passage 24 adjacent the opening into the by-pass 27 than there is within the goose-neck adjacent to the opening in the fuel nozzle 7, and the consequence is that during the starting of the engine there is a slightly greater pressure upon the level of the fuel in the float-can than there is upon the fuel in the nozzle. This difference may be varied and adjusted by means of the spring 26 controlling the valve 25 so that whatever pressure it requires to open check valve 25, a correspondingly greater amount of pressure will be imparted to the fuel within the float-can, thus guaranteeing a certainty of fuel feed at the nozzle during the starting operation. When the engine has attained sufficient momentum, as before indicated, and the valve 23 is closed, the said check valve 25 is automatically closed to shut off the passage through the goose-neck from the by-pass 27, following which the pressures upon the fuel in both the float-chamber and the fuel nozzle will substantially equalize and operate in the usual manner.

It should be understood that I have attempted herein to describe only one form of my invention, and that I am aware that various changes and modifications may be readily made as to details and arrangement of parts.

What I claim is:

1. In a carbureter, a duct, a fuel supply nozzle projecting into the passage of said duct, two separate and independent air inlets entering said duct at one side of said fuel nozzle, a check valve for each inlet, a fuel reservoir, means for maintaining fuel therein at a substantially constant level, a fuel pipe connecting said fuel reservoir with said fuel nozzle, a by-pass connecting the interior of said fuel reservoir with the interior of one of said inlets back of the check valve therein, an air vent in said fuel reservoir, and a back pressure valve therefor to close said reservoir to the entrance of air when pressure within the same is in excess of atmosphere.

2. In a carbureter, a duct, a valved fuel nozzle therein, an air inlet for said duct opening to the atmosphere, another independent air inlet for said duct opening to a compressed air line, a manually controllable valve for the latter, means for automatically closing the first mentioned inlet when said valve in the compressed air line is open, and

means for maintaining a substantially uniform level of fuel in the fuel nozzle whether air is being supplied to said duct from the atmosphere or from the compressed air line.

3. In a carbureter, a duct, a valved fuel nozzle therein, an air inlet for said duct opening to the atmosphere, another and independent air inlet for said duct opening to a compressed air line, a manually controllable valve for the latter, means for automatically closing the first mentioned inlet when the said valve in the compressed air line is open, and means for maintaining a substantially uniform level of fuel in the fuel nozzle whether air is being supplied to said duct from the atmosphere or from the compressed air line, said means comprising a fuel reservoir connected with said fuel nozzle, a fuel supply pipe leading into said reservoir, a valve therefor, a float operated by the level of fuel within the reservoir for controlling said valve, a by-pass for air connecting the compressed air line, at a point between the valve and the fuel nozzle, with the interior of the fuel reservoir for maintaining an equilibrium of pressure upon the fuel in the reservoir and the fuel in the nozzle while air is being admitted through the compressed air line.

4. In a carbureter, a duct, a valved fuel nozzle therein, an inlet for said duct opening to the atmosphere, another and independent air inlet for said duct opening to a compressed air line, a manually controllable valve for the latter, means for automatically closing the first mentioned inlet when the valve in the compressed air line is open, and means for maintaining a substantially uniform level of fuel in the fuel nozzle whether air is being supplied to said duct from the atmosphere or from the compressed air line, said means comprising a fuel reservoir connected with said fuel nozzle, a fuel supply pipe leading into said reservoir, a valve therefor, a float operated by the level of fuel within the reservoir for controlling said valve, a by-pass for air connecting the compressed air line, at a point between the valve and the fuel nozzle, with the interior of the fuel reservoir for maintaining an equilibrium of pressure upon the fuel in the reservoir and the fuel in the nozzle while air is being admitted through the compressed air line, and a back pressure valve in said compressed air inlet between the point of connection of said by-pass and said fuel nozzle.

5. In a carbureter, a duct, a fuel nozzle therein, a valve therefor, a spring for normally exerting a pressure on said valve in a direction to open it, an inlet to said duct from the atmosphere, a check valve therein, restricted air ducts through said check valve, means connecting said check valve with said fuel valve whereby the closing movement of said check valve will impart a corresponding

movement to said fuel valve, and a spring for normally closing said check valve and of sufficient strength to perform said work and to overcome the tension of the needle valve spring.

6. In a carbureter, a duct, a fuel nozzle therein, a valve therefor, a spring for normally exerting a pressure on said valve in a direction to open it, an inlet to said duct from the atmosphere, a check valve therein, restricted air ducts through said check valve, means connecting said check valve with said fuel valve whereby the closing movement of said check valve will impart a corresponding movement to said fuel valve and a spring for normally closing said check valve and of sufficient strength to perform said work and to overcome the tension of the needle valve spring, a back pressure valve for said restricted passages, a second air inlet communicating with a compressed air line, and a valve therefor.

7. In a carbureter, a duct, a fuel nozzle therein, a valve therefor, a spring for normally exerting a pressure on said valve in a direction to open it, an inlet to said duct from the atmosphere, a check valve therein, restricted air ducts through said check valve, means connecting said check valve with said fuel valve whereby the closing movement of said check valve will impart a corresponding movement to said fuel valve, and a spring for normally closing said check valve and of sufficient strength to perform said work and to overcome the tension of the needle valve spring, a back pressure valve for said restricted passages, a second air inlet communicating with a compressed air line, a valve therefor, and means for maintaining a substantially uniform level of fuel in the fuel nozzle, including a valve operating float for regulating the fuel level, and a by-pass for compressed air connecting the compressed air line, at a point between the valve therein and the needle valve, with the space within the fuel reservoir, means to manually open and close the compressed air line, means to automatically open and close communication between the duct of the carbureter and the said by-pass, the restricted air passages in the first mentioned check valve being normally open so long as the compressed air controlling valve is closed and vice versa, a vent in the fuel reservoir, and automatic means for opening said vent when the compressed air valve is closed, and vice versa.

8. In a carbureter, an air passage communicating with the atmosphere, a fuel nozzle therein, a fuel reservoir connected with said fuel nozzle and having means to maintain fuel in said nozzle at a substantially uniform level under normal operation, a compressed air inlet entering the first mentioned air passage, a valve therefor, a

check valve therein, a by-pass leading from said compressed air inlet between said valves to the fuel reservoir, and means to close the atmospheric inlet when the compressed air valve is opened whereby pressure upon the fuel in the fuel reservoir will be in excess of the pressure within the air passage of the carbureter in the vicinity of the fuel nozzle while compressed air is being passed therethrough.

9. In a carbureter having an air passage, an atmospheric inlet, a compressed air inlet, valves therefor, a fuel nozzle in said carbureter passage, a fuel supply reservoir with means for maintaining a substantially uniform fuel level in said nozzle, and with means for applying a higher pressure upon the fuel within the fuel reservoir while compressed air is being injected through the passage in the carbureter than during the period when air is entering said carbureter passage at atmospheric pressure.

10. In a carbureter having an air passage, an atmospheric inlet, a compressed air inlet, valves therefor, a fuel nozzle in said carbureter passage, a fuel supply reservoir with means for maintaining a substantially uniform fuel level in said nozzle, means for

applying a higher pressure upon the fuel within the fuel reservoir while compressed air is being injected through the passage in the carbureter than during the period when air is entering said carbureter passage at atmospheric pressure, and with means for varying the degree of difference in said pressures.

11. In a carbureter having an air passage, an atmospheric inlet, a compressed air inlet, valves therefor, a fuel nozzle in said carbureter passage, a fuel supply reservoir with means for maintaining a substantially uniform fuel level in said nozzle, means for applying a higher pressure upon the fuel within the fuel reservoir while compressed air is being injected through the passage in the carbureter than during the period when air is entering said carbureter passage at atmospheric pressure, and with means for varying the degree of difference in said pressures comprising an adjustable spring controlled check valve in said compressed air inlet passage.

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Witnesses:

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