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C. W. HOUGH

1,489,639

CARBURETOR

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Fig. 1.

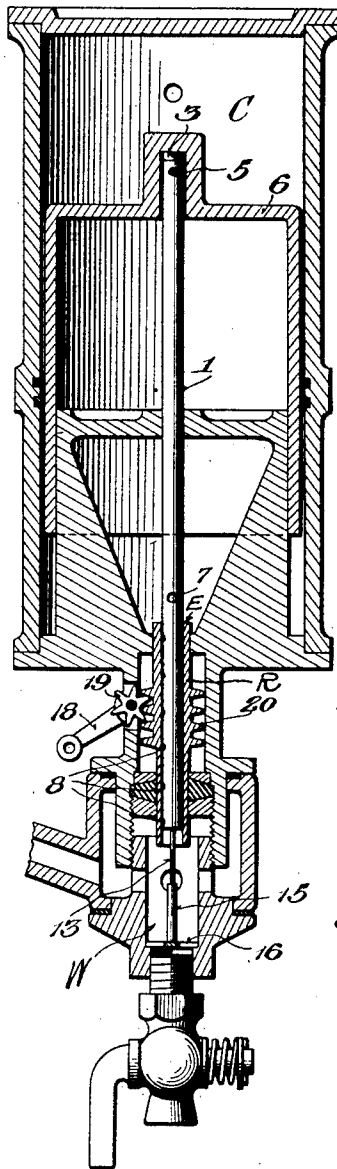


Fig. 2.

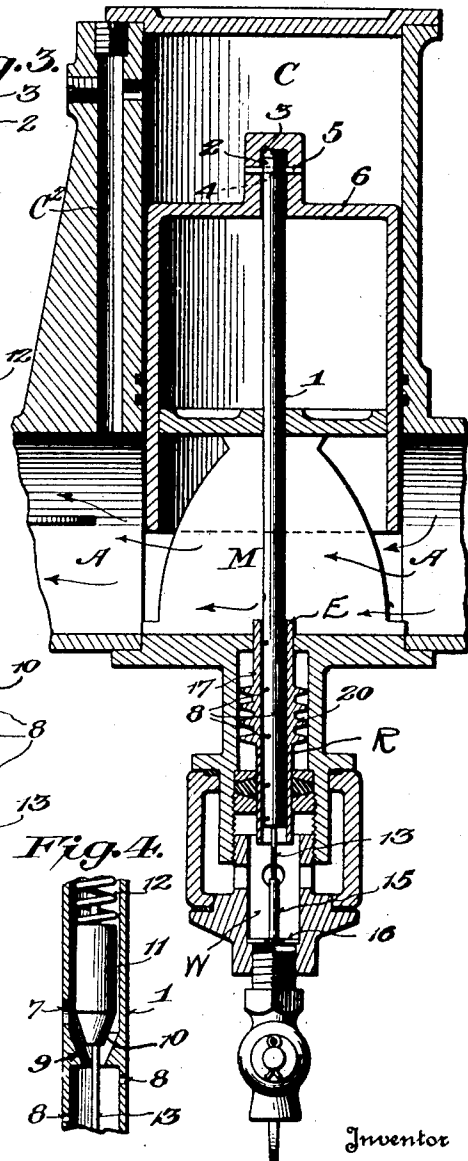


Fig. 3.

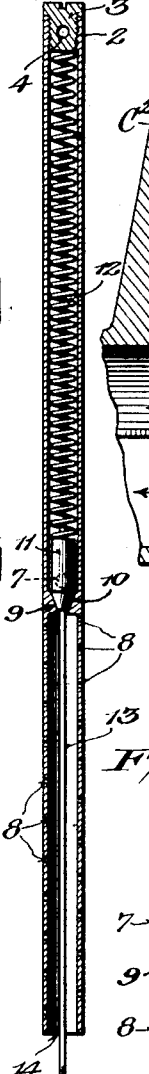
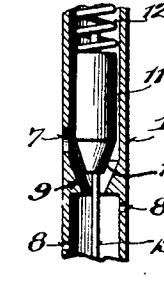


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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CARBURETOR.

Application filed March 21, 1921. Serial No. 454,088.

To all whom it may concern:

Be it known that I, CLINTON W. HOUGH, a citizen of the United States, residing at Boonville, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Carburetors, of which the following is a specification.

This invention relates to carburetors and has particular reference to an improved fuel valve for controlling the feed of raw fuel to the air stream.

A primary object of the invention is to provide a fuel valve having the capacity for regulating the supply of raw fuel to the mixing throat of the carburetor in such a manner as effectively and directly to distribute the raw fuel into the air passing through the carburetor to maintain maximum efficiency of carburation. Fuel inlet devices or fuel valve of the type providing only a single feed orifice supply the raw fuel to the mixing chamber in a more or less concentrated state in a single jet which results in an improper mixing of the air and liquid fuel in horizontal carburetors because of the fact that the latter is only brought into contact with the lower strata of air passing through the mixing chamber.

The present invention therefore contemplates a device that will distribute the fuel throughout the entire cross section of the incoming air to more thoroughly mix the air and fuel and thereby obtain a more economical operation of the carburetor for varying motor speeds.

A further and more specific object of the invention is to provide a measuring fuel valve providing a plurality of raw fuel discharge orifices adapted to be automatically brought into play to meet all conditions of running, such for instance as starting, idling, slow running, and speed.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the mixing portion of a carburetor.

Figure 2 is a vertical sectional view taken at right angles to the line of section of Figure 1.

Figure 3 is an enlarged detail vertical sectional view of the improved measuring pin.

Figure 4 is a detail sectional view illustrating the position of the graduating valve within the measuring pin when the motor is started.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

The present invention is intended and especially adapted for use in connection with standard carburetor structure of the type, for example, shown in U. S. Patent No. 1,344,696 dated June 29, 1920. The invention is, therefore, primarily concerned with the provision of an improved fuel inlet and distributing device or so called metering or measuring pin which will provide a thorough and practical mixing of the raw fuel with the air in a more effective manner than is possible where the raw fuel is supplied in a single jet substantially at the bottom of the air intake passage.

In the type of carburetor referred to in U. S. Patent No. 1,344,696, the fuel valve is automatically moved by an air piston controlled by the suction of the motor thereby to vary the fuel supply in accordance with different running speeds, the setting of the carburetor for temperature, altitude, and maximum and minimum power requirements being accomplished by an adjustable sleeve or feed regulator controlled from the dash of the machine.

Where only a single feed orifice is provided, the proper supply is not provided for all motor speeds. To obtain smooth and economical operation of the motor, the fuel outlet area in the fuel valve should vary following an irregular curve and not a straight line. This is, for starting, idling and very slow running, the area of the orifice should be relatively large because the suction of the jet is comparatively low, but when the motor speeds up and the suction increases, a smaller fuel outlet area will suffice. Then, as more and more power is required and speed further increases, larger jet areas may be brought into play following a curve which is in relation to the characteristics of the motor. It is, therefore, the object of the

present device to supply the correct quantity of raw fuel at the proper point for mixing with the air under all conditions of use.

Accordingly, by reference to the accompanying drawings, it will be observed that one way of accomplishing the desired result is to provide a hollow or tubular fuel valve having a plurality of jet orifices, certain of which are adapted for starting while others may be automatically brought into play in accordance with the speed developed by the operation of the motor.

In the embodiment shown in the accompanying drawings, the tubular fuel valve 1 is preferably formed at its upper end 2 to receive a closure plug 3 having an opening 4 to accommodate the suspension pin 5 in the head of the regulating piston 6 by which the metering pin is carried and automatically lifted when the suction of the motor produces a partial vacuum in the piston chamber C by drawing the air through the passage-way C² in the well known manner. The intermediate portion 25 of the tubular fuel valve is provided with the relatively large starting orifice 7 while the portion thereof between the said orifice 7 and the lower end is provided with a plurality of relatively smaller atomizing running openings 8 arranged to spray the fuel into the entire cross section of the incoming air stream whereby it is effectively distributed and calibrated in accordance with the predetermined conditions to be met in the functioning of the engine or motor.

Adjacent the starting orifice 7 of the interior of the tubular measuring pin is provided with a valve seat 9 for receiving the tapering end 10 of a graduating fuel valve 11 which is normally held to its seat by the compressed spring 12 housed within the tube and confined between the closure plug 3 and the rear end of the valve body. The said graduating valve 11 is provided with a stem extension 13 which extends through and beyond the open end 14 of the tubular body of the pin where it is provided with an adjustable bearing nut 15 or its equivalent adapted to engage with a suitable abutment 16 in the bottom of the fuel well W of the carburetor. The provision of this adjustable bearing member 15 enables the graduating valve 11 to be set in such a position that it is normally held away from its seat 9 in the interior of the tube when the motor is at rest to provide open communication between the fuel supply chamber W and the starting orifice 7, whereby, when the motor is turned over to start, a priming quantity of fuel may be readily available. As the motor speed increases and the suction through the air intake passage A becomes greater, the piston 6 will rise due to the partial exhaustion of air from the chamber C through the passageway C².

This raising of the piston and pin will have the effect of closing the tapered portion 10 of the valve 11 on to its seat 9 thereby to reduce and finally to entirely close the passage for the fuel through the starting orifice 7 and cause the fuel to be sucked through such of the smaller running ports 8 as may be exposed above the upper edge B of the tubular sleeve portion 17 of the manually operated gasoline feed regulator R. The said feed regulator which is manually set to meet existing conditions is controlled from the dash through the lever and rack and pinion arrangement 18, 19 and 20 and a dash and pull operating rod leading from the lever 18 to the dash, as fully described in U. S. Patent No. 1,344,696 previously referred to.

The construction described provides a rich mixture for starting, idling, and very slow speed, and automatically operates to provide a leaner mixture as soon as the motor is well under way. Then, as the motor increases in speed and the piston 6 elevates higher in the chamber C, it will draw the tubular fuel inlet and distributing device or fuel valve further out of the sleeve portion of the gasoline feed regulator to expose a greater number of running jet orifices 8 or vice versa to thereby increase and decrease the quantity of gasoline as required under existing conditions at varying motor speeds, following the characteristic curves of the motor.

The effect of providing a hollow or tubular fuel inlet and distributing device or so-called metering pin with the starting orifice and running orifices which are automatically controlled by the motor, is to provide a plurality fuel spraying nozzle which ejects the fuel over the entire cross section of the air stream sweeping through the relatively contracted mixing throat M of the carburetor. Thus, instead of having the fuel supplied in a more or less concentrated single stream, the device constituting the present improvement provides for breaking up and distributing the raw fuel in the air stream so as to more thoroughly saturate the swiftly moving air with the fuel to obtain a better mixture for all running conditions.

It will, therefore, be apparent that the invention is particularly directed to a tubular fuel inlet and distributing device for fuel valves having ports of different area so distributed and arranged as to meet automatically the fuel needs of the motor under starting, idling and varying load conditions.

Without further description, it is thought that the features and advantages of the improvement will be readily apparent to those skilled in the art, and it will, of course, be understood that changes in the form, proportion and details of construction may be

resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

5 1. In a carburetor, a piston controlled and operated fuel inlet and distributing device having a plurality of fixed capacity fuel vaporizing orifices adapted to be suc-
cessively moved into discharging position at
10 all running positions of the controlling piston, and also having a variable capacity fuel outlet discharging into the air stream at the starting and idling positions of the piston, spring tensioned valve means for con-
15 trolling said variable capacity fuel outlet whereby it is gradually closed by the spring tensioned valve following the upward movement of the operating piston thereby to graduate the amount of fuel supplied under
20 the starting and idling positions.

2. In a carburetor the combination of a vertically movable suction controlled piston, a tubular fuel inlet and distributing device, said fuel inlet having a starting and
25 idling orifice and a plurality of orifices feeding fuel for normal running, a relatively fixed sleeve member cooperating with the fuel inlet and normally closing the orifices feeding fuel for normal running, said

fuel inlet being operated by the piston to
bring the orifices feeding fuel for normal
running into operation successively as the
piston lifts, a valve for controlling the start-
ing and idling orifice, and means for ad-
justing the position of said valve compris-
35 ing a valve stem of adjustable length.

3. In a carburetor, the combination of a suction controlled piston, a tubular fuel inlet and distributing device having a starting
and idling orifice and a plurality of orifices
40 feeding fuel for normal running, a relatively fixed sleeve member cooperating with the fuel inlet device and normally closing the orifices feeding fuel for normal run-
ning, said fuel inlet device being operated
45 by the piston to bring the orifices feeding fuel for normal running into operation successively as the piston lifts, a valve arranged between the starting and idling orifices, and means for keeping the valve un-
50 seated while the piston is down and closing the same when the piston lifts.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CLINTON WALLACE HOUGH.

Witnesses:

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F. W. PAYLER.