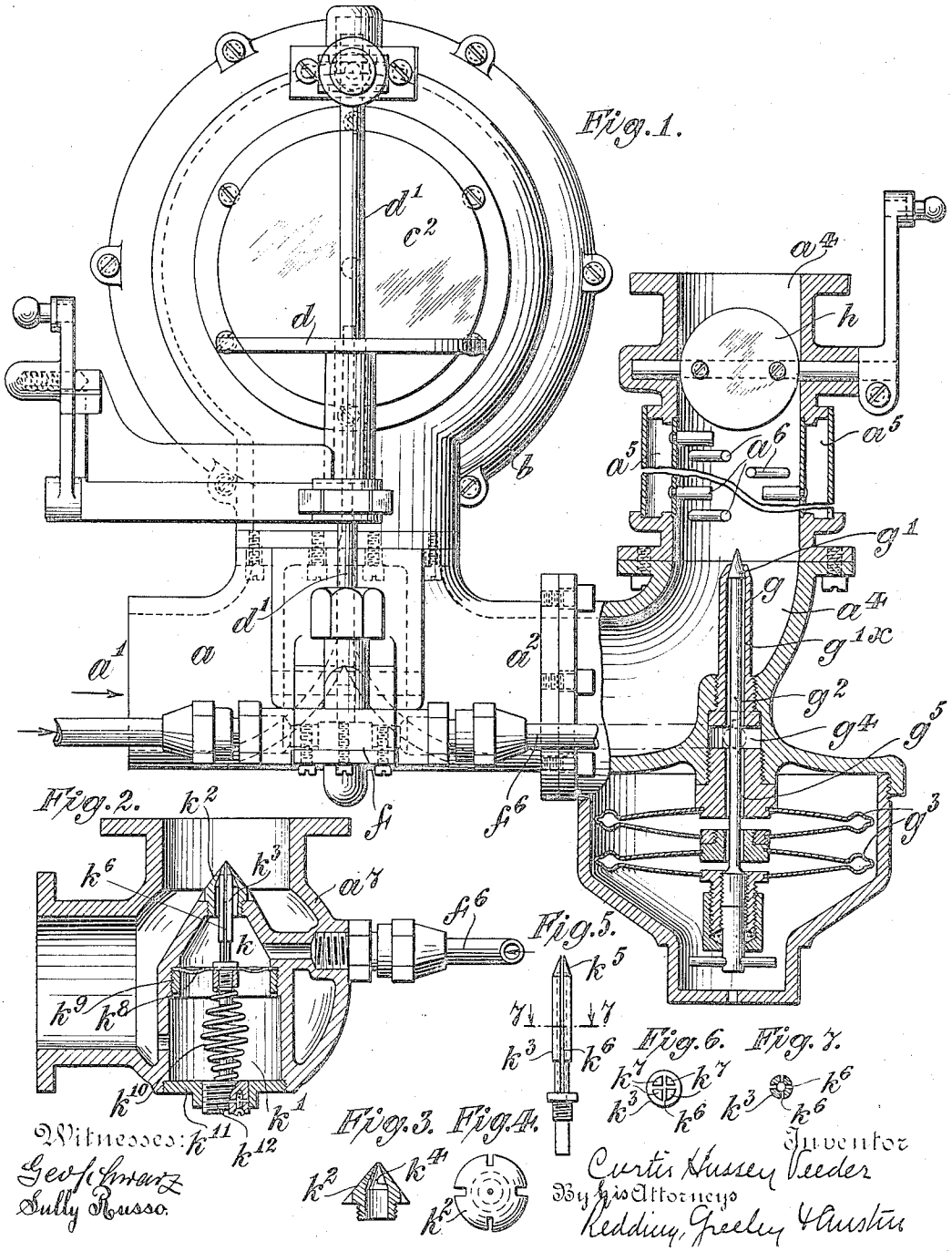
C. H. VEEDER

CARBURETER.

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1,127,120.

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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,127,120. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed April 29, 1911. Serial No. 624,169.

To all whom it may concern:

Be it known that I, CURTIS HUSSEY VEEDER, a citizen of the United States, residing in the city of Hartford, in the State of Connecticut, have invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

In another application for Letters Patent filed October 31, 1910, Ser. No. 590,073, (Patent No. 1,119,479, Dec. 1, 1914), there is shown and described an improvement in carbureters whereby the correct proportions of the mixture of air and hydrocarbon vapor may be secured under all conditions of operation, that is, in which the hydrocarbon shall be fed in proportion to the volume of air which passes through the carbureter, regardless of variation in the velocity of the air. In the carbureter shown and described in said application the hydrocarbon is delivered to the nozzle, under pressure developed by a pump, in a strong jet or spray, so that it may be vaporized readily by the air. It is desirable that the pressure of the hydrocarbon at the extremity of the nozzle shall be kept uniform whatever may be the rate of discharge, in order that the hydrocarbon may be delivered as a jet or spray regardless of the rate of discharge. In order to accomplish this purpose, in accordance with the present invention, the area of discharge of the hydrocarbon through the nozzle is varied in direct proportion to the volume or rate of discharge of the hydrocarbon, so that the velocity of discharge is preserved, even when the volume or rate of discharge is comparatively low.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated as embodied in certain convenient and practical forms, and in which—

Figure 1 is a view partly in elevation and partly in vertical section of a carbureter to which the invention is applied. Fig. 2 is a view in section showing another form of the nozzle. Figs. 3–7 are detail views of parts of the nozzle shown in Fig. 2.

In the carbureter shown in the drawings, the air to be carbureted is admitted at a' to a shell or casing a which is also provided with an outlet, as at a^2, through which the air is carried on toward the engine. The air, in its passage through the carbureter, is made to pass through a suitable positive motor, located at b, which, through a friction disk c^2 and a co-acting friction disk d, movably mounted on a shaft d', so as to vary the speed of the driven part, drives a pump of any suitable character, indicated at f. The latter delivers the hydrocarbon through a pipe f^6 to the hydrocarbon nozzle g which is suitably located in the outlet pipe a^4 by which the air is conducted from the air motor toward the engine cylinder. It is obvious that the delivery of hydrocarbon by the pump will be in proportion to the volume of air which passes through the carbureter in a given time and varies under different conditions and also in proportion to the relative speed of the pump as determined by the variable driving mechanism between the motor and the pump. Under these conditions, with a nozzle of the ordinary type, in which the relative positions of the needle valve and its tube are fixed (except as adjusted by hand from time to time for purposes of regulation) and the area of discharge is constant the pressure of the hydrocarbon at the extremity of the nozzle would vary more or less so that at times the strong jet or spray which is desirable might not be formed. In accordance with the present invention, however, provision is made whereby the pressure of the hydrocarbon at the extremity of the nozzle shall be kept uniform, whatever may be the rate of discharge, so that the desired jet or spray shall be formed under all conditions. To this end the area of discharge of the hydrocarbon through the nozzle is varied in direct proportion to the volume or rate of discharge of the hydrocarbon under varying conditions, so that the velocity of discharge is preserved, even when the volume or rate of discharge is comparatively low. In order that the area of discharge shall be controlled in direct proportion to the rate of discharge of the hydrocarbon, which is dependent upon the pressure within the conduit, the nozzle g is provided with a needle valve g', the needle g^2 and the shell or tube $g'^{\times}$, of which are relatively movable with the varying pressure of the hydrocarbon, it being most convenient to make the needle g^2 movable with respect to the shell or tube $g'^{\times}$ under the varying pressure of the hydro-

carbon. Any of the well known pressure regulating devices, such as a piston or diaphragm, may be provided for the purpose of controlling the relative position of the needle and shell or tube. Thus, in the arrangement shown in Fig. 1 of the drawings, the needle g^2 is supported by one member of a bellows diaphragm g^3 which is suitably located so as to be subject to the pressure of the hydrocarbon in its passage to the nozzle, as, for example, in the chamber g^4, which communicates, through a passage g^5 around the needle g^2, with the interior of the bellows diaphragm. It will be seen that as the pressure increases the bellows diaphragm is expanded and the needle g^2 is moved in a direction to increase the area of discharge and therefore to preserve the pressure at the extremity of the nozzle and that as the pressure decreases the bellows diaphragm collapses and the needle g^2 is moved in a direction to decrease the area of discharge and therefore to preserve the pressure, notwithstanding the diminution of the flow.

A throttle valve h may be provided, as usual, in the pipe a^4 and may be operated by any usual or suitable means. The pipe a^4, between the nozzle g and the throttle valve forms a vaporizing chamber in which the hydrocarbon supplied through the nozzle g is vaporized by the air supplied through the shell a and may also be provided with a water jacket a^5 and with inwardly projecting pins a^6 for the purpose of securing a better separation and precipitation of the hydrocarbon which is not thoroughly vaporized before it passes farther from the carbureter.

In the construction of nozzle shown in Figs. 2–7 the pipe elbow a^7, through which the air passes, is formed with a chamber k to which the hydrocarbon pipe f^6 is connected, and with a spring chamber k'. The chamber k is adapted to receive a tip k^2, which, with the relatively movable needle k^3, constitutes the valve. The nozzle tip k^2 is tapered internally, as indicated at k^4, and the needle k^3 is tapered at its point, as at k^5, and is also slotted longitudinally, as at k^6, the parts k^7 being sprung apart so that when the needle is withdrawn from the tip the hydrocarbon shall pass out freely through the slots, and so that when the needle is pressed into the tip the parts k^7 shall be pressed together at their extremities to reduce the area of discharge through the slots. This form of nozzle is considered desirable because it forms a jet which is more readily vaporized and is more certain to be carried straight up into the axis of the mixing tube. The needle is carried by a very flexible diaphragm k^8, of leather or other suitable material, which is supported by a threaded sleeve k^9, and is backed by a spring k^{10} which is preferably adjustable, being seated for this purpose upon a screw plug k^{11} in the cap k^{12} of the chamber k'. As the spring k^{10} is relatively long and has a relatively large initial tension, the slight motion necessary to open the valve will not change the pressure of the spring materially, so that when the spring is once regulated the valve will be very sensitive, responding to very slight changes of pressure in the chamber k, so that the area of discharge of the hydrocarbon through the valve is varied closely in direct proportion to the rate of discharge of the hydrocarbon which, as hereinbefore indicated, is dependent upon the pressure of the hydrocarbon within the conduit and the chamber k.

It will be seen that other well known regulating devices may be substituted for those shown for the purpose of keeping the pressure uniform at the extremity of the nozzle regardless of the variation of pressure under which the hydrocarbon is delivered to the nozzle and of the consequent variation in the rate of discharge, and that the invention, therefore, is not limited to the particular construction and arrangement shown and described herein. It will also be understood that although the invention is shown and described herein as applied to a carbureter of a particular type it might also be applied with suitable adjustment to a carbureter of the ordinary suction type.

I claim as my invention:

1. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a variable nozzle through which the hydrocarbon is delivered, and means controlled by the pressure of the hydrocarbon before it reaches the nozzle to increase the area of discharge of the hydrocarbon in direct proportion to the pressure of the hydrocarbon to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle.

2. In a carbureter, means to supply air, a nozzle through which the hydrocarbon is discharged, a forced feed to deliver the hydrocarbon in volumetric proportion to the supply of air, means controlled by the pressure of the hydrocarbon before it reaches the nozzle to vary the area of discharge to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle.

3. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a nozzle through which the hydrocarbon is delivered and comprising a relatively movable needle and tube, and means subject to the pressure of the hydrocarbon to vary the relative posi-

tion of the needle and the tube to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle.

4. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a nozzle through which the hydrocarbon is delivered and comprising a tube or shell and a relatively movable needle coöperating therewith to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle, and means subject to the pressure of the hydrocarbon and connected to the needle to vary the position thereof.

5. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a nozzle through which the hydrocarbon is delivered, and means to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle, said means including a needle movable relatively to the nozzle to control the area of discharge thereof and a yielding support for the needle subject to the pressure of the hydrocarbon.

6. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a nozzle through which the hydrocarbon is delivered, and means to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle, said means including a needle movable relatively to the nozzle to control the area of discharge thereof, a flexible diaphragm supporting the needle and subject to the pressure of the hydrocarbon before it reaches the nozzle and a spring backing up the diaphragm.

7. In a carbureter, means to supply air, means to feed the hydrocarbon in volumetric proportion to the supply of air, a nozzle to which the hydrocarbon is delivered and comprising an internally tapered tube or shell and a relatively movable tapered and longitudinally slotted needle, and a yielding support for the needle subject to the pressure of the hydrocarbon before it reaches the nozzle to move the needle and control the area of discharge of the slot to maintain the pressure at the nozzle substantially constant notwithstanding variations in the rate of discharge of the hydrocarbon at the nozzle.

This specification signed and witnessed this 24th day of April, A. D., 1911.

CURTIS HUSSEY VEEDER.

Signed in the presence of—
E. Barrie Smith,
C. G. Allyn.