Feb. 6, 1934. H. H. HUBER 1,946,284

CARBURETOR

Filed May 15, 1931 2 Sheets-Sheet 1

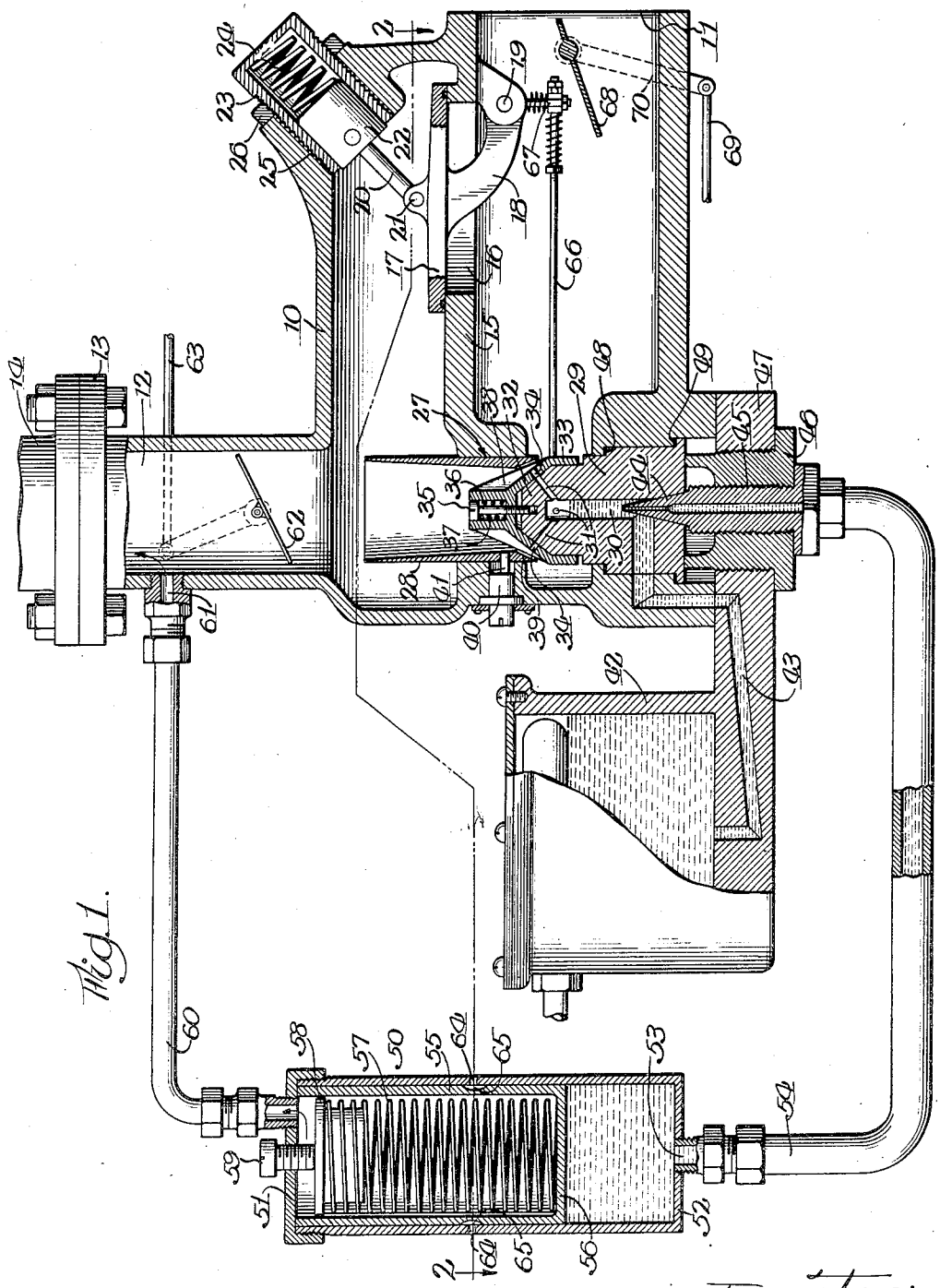

Fig. 1.

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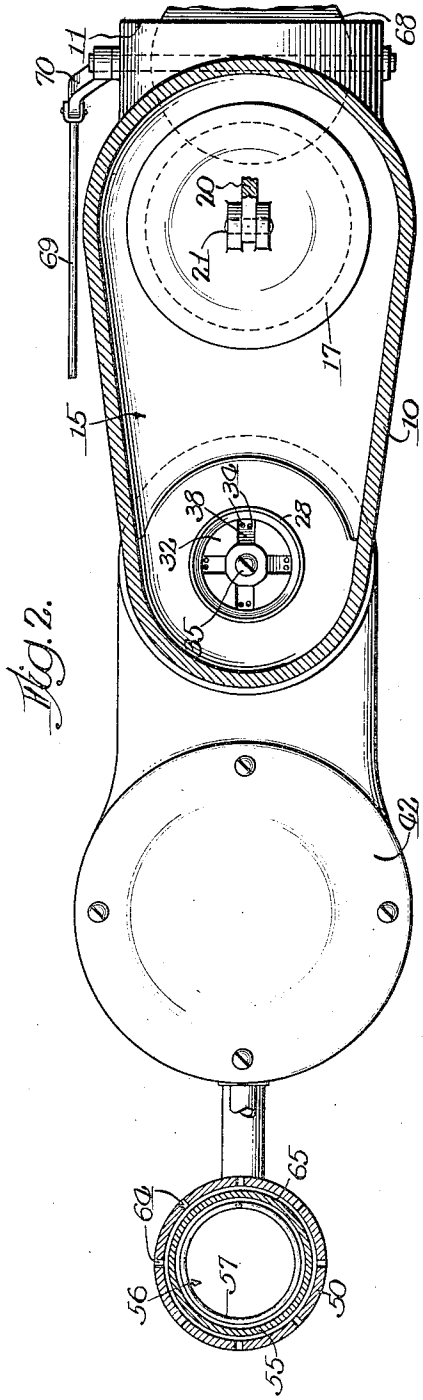

Fig. 2.

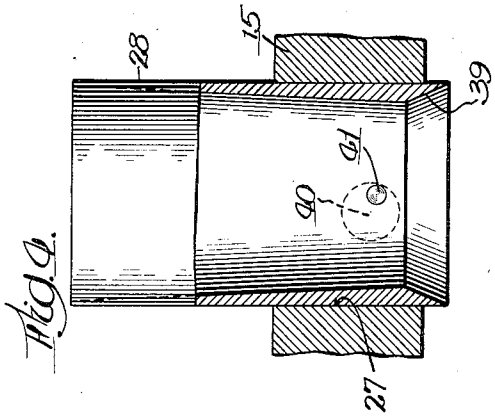

Fig. 4.

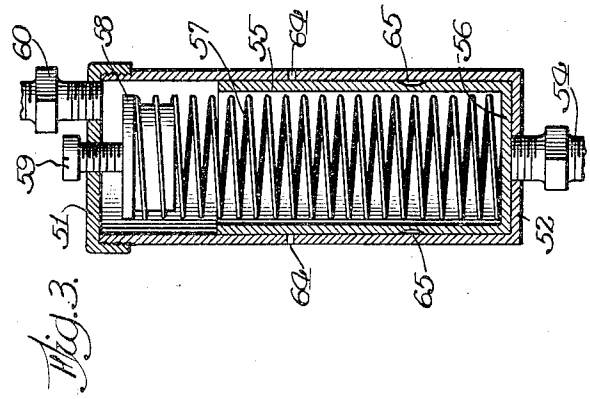

Fig. 3.

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Patented Feb. 6, 1934 1,946,284

UNITED STATES PATENT OFFICE

1,946,284

CARBURETOR

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Application May 15, 1931. Serial No. 537,550

4 Claims. (Cl. 261—34)

This invention relates to improvements in carburetors, and particularly to the type in which fuel is atomized and mixed with air to form a combustible charge delivered to the engine, and wherein the mixture of air and gas is automatically controlled and regulated by the suction or vacuum created in the engine, and one of the objects of the invention is to provide improved means whereby when the suction or vacuum drops, by reason of the opening of the throttle, a supply or quantity of fuel will be automatically supplied to the engine, through the medium of means, such as a pump device having a plunger operating in one direction by mechanical means and in the opposite direction and against the stress of the mechanical means, by the suction in the engine.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a vertical, longitudinal sectional view of a carburetor of this character constructed in accordance with the principles of this invention, and with parts omitted.

Figure 2 is a sectional view taken on line 2—2, Figure 1.

Figure 3 is a detail sectional view of the pump device showing the piston in another position from what is shown in Figure 1.

Figure 4 is an enlarged detail section view of an adjusting sleeve which co-operates with the nozzle.

Referring more particularly to the drawings the numeral 10 designates generally the housing or casing of the carburetor which is provided with an air inlet opening 11 and a discharge outlet opening 12 which is connected by means of the usual flanges 13, preferably to the intake manifold 14 of the engine.

Arranged within the housing 10 is a partition 15 having an opening 16 therethrough of any desired diameter through which air from the inlet 11 may pass. A valve 17 is provided for closing the opening 16 and this valve is preferably provided with an arm 18 pivotally connected as at 19 to a support for swinging movement. The valve 17 is adapted to be opened by suction created in the engine, and any suitable means may be provided for exerting the desired stress upon the valve 17 so that the degree of suction necessary to open the valve 17 may be varied. A simple and efficient means for accomplishing this result embodies a link 20 pivotally connected to the valve as at 21 and also pivotally connected to a member 22 which is adapted to slide in a cap or tubular member 23 against the stress of a spring 24. The cap or member 23 is adjustably mounted in one of the walls of the housing preferably by means of screw threads 25, and a lock nut 26 is provided for holding the member 23 in its adjusted position.

The partition 15 is provided with an additional opening 27 of any desired diameter and projecting into the opening is a sleeve 28 that is open at both ends. A nozzle 29 is supported in any suitable manner beneath the partition 15 and is provided with a fuel opening 30 therein having branch openings 31 extending through the surface of a tapered portion 32.

Rotatably supported by the nozzle 29 is a cap 33 having openings 34 adapted to be moved into and out of register with the openings 31. This cap is held in position in any suitable manner preferably by means of a fastening screw 35 which passes through a recess 36 in the cap 33 and is threaded into the end of the nozzle. A spring 37 is provided for causing the inner surface of the cap to be maintained in contact with the periphery of the tapered portion of the nozzle. The cap 33 is provided with air passages 38 in its outer periphery with which the openings 34 communicate and these air passages 38 incline toward the apex of the cap 33 to substantially meet within the sleeve 28. The inner wall of the lower open end of the sleeve 28 is inclined as at 39 and co-operates with the air passages 38 to vary the size of the passage and thereby control the amount of air which flows through the passages 38 into the sleeve. The sleeve 28 is adapted to be adjusted vertically with respect to the nozzle in any suitable manner, such as by means of an adjusting element 40 having an eccentrically arranged pin 41 projecting into and opening in the sleeve so that by the rotation of the element 40 the sleeve 28 may be raised or lowered.

The numeral 42 designates the usual fuel tank which has communication with the opening 30 in the nozzle by means of a passage 43 and this tank is supplied with fuel from any source in the usual manner.

Projecting into the opening 30 of the nozzle 33 is an injector nozzle 44, the upper end of which is tapered so as to permit the injector nozzle to be positioned so that the extremity

thereof will preferably be disposed above the point of communication between the passage 43 and the passage 30, so that when fuel is injected through the nozzle 44, in a manner to be set forth, it will be forced through the openings 31—34 and into the air passages 38 to be delivered through the sleeve 28 to the engine.

The location of the extremity of this injector nozzle 44 above the outlet of the passage 43 obviates the necessity of forcing the injected fuel against the pressure in the tank or reservoir 42.

The nozzle 44 is adjustably held in position in any suitable manner, preferably by being threaded as at 45 through a nut 46, the latter being threaded into a member 47 forming an extension of the bottom of the tank and the extremity of the nut 42 engages the bottom of the nozzle 29 so as to force shoulders 48—49 of the nozzle against corresponding shoulders in the wall of the housing, thereby not only firmly securing the nozzles in position but permitting of the removal of the nozzles when desired.

The numeral 50 designates generally a cylinder which is preferably arranged in an upright position and is provided with a closed top 51 and closed bottom 52. A discharge outlet opening 53 is provided in the bottom of the cylinder and connected with this outlet is a pipe 54 which also has communication with the injector nozzle 44 so that fuel forced from the cylinder 50 will be injected through the injector nozzle 44 into the passage 33 of the nozzle 29.

Arranged within the cylinder 50 is a piston 55 which is preferably provided with a closed bottom 56 and an open top, and a spring 57 is arranged within the piston. One end of the spring rests against the bottom 56 of the piston and the other end against a disc or member 58 within the piston. The tension of the spring 57 may be varied in any suitable manner such as by means of an adjusting screw 59 passing through the top 51 of the cylinder and contacting with the disc or plate 58. Leading through the top 51 of the cylinder is an opening with which a pipe 60 is connected at one end. The other end of this pipe is connected preferably to the carburetor as at 61 on the suction side of the throttle valve 62, or if desired, this pipe may be connected directly with the intake manifold of the engine.

The opening in the top of the cylinder 50 with which the pipe 60 is connected is disposed within the area of the open end of the piston 56, so that when the piston is in the position shown in Figure 1 it will form a seal or closure for such opening.

The operation of this portion of the carburetor is as follows. When the engine is in operation, that is when there is a suction being created in the engine, this suction will be manifested through the opening 61 and pipe 60, in the cylinder 50 above the piston 56 and when this suction, or vacuum, is sufficient to overcome the stress of the spring 57 the piston will be held elevated or in the position shown in Figure 1, so that the fuel which is supplied from the tank or chamber 42 seeking its level in the cylinder 50, will fill the space beneath the piston 56. Obviously by adjusting the screw 59 and by varying the stress of the spring 57 the degree of suction necessary to move and hold the piston 55 in the position shown in Figure 1, may be varied.

As long as the suction, or vacuum overcomes the stress of the spring 57, the piston 55 will be held elevated. When, however, the vacuum or suction in the engine drops for any cause, such as the result of the operation of the throttle valve 62 through the medium of the usual operating rod 63, the stress of the spring 57 will suddenly force the piston 55 downwardly to the position shown in Figure 3, and thereby force the fuel out of the chamber 50 through the discharge outlet opening 53 and eject the same through the injector nozzle 44 and through the nozzle 29, causing a supply of fuel to be supplied to the engine.

When the suction or vacuum rises so that it will be sufficient to overcome the stress of the spring 57 the piston 55 will be again raised from the position shown in Figure 3 to the position shown in Figure 1, thereby permitting an additional supply of fuel to flow back into the cylinder 50 beneath the piston to be ejected upon the next operation of the piston.

Obviously this operation will be repeated when the vacuum or suction increases and decreases.

If desired, and as a means for preventing any of the fuel from leaking past the piston 55 and into the pipe 60, between the walls of the piston and cylinder, there may be provided openings 64 in the cylinder wall with which a circumferential groove or recess 65 in the periphery of the piston is adapted to register when the parts are in the position shown in Figure 1, so that in the event the suction or vacuum in the engine would have a tendency to draw up any of the fuel between the piston and cylinder, such tendency will be overcome by the air which enters the opening 64 and fills the groove or recess 65 to form a fluid seal against such operation.

The specific construction of the nozzle 29 and the cap 33 connected to and co-operating therewith and the manner of rotating the cap so as to vary the size of the outlets of the openings 33 by the adjustment of the openings 34 with respect thereto, forms no part of the present invention but constitutes a portion of the subject matter of the invention described and claimed in application Serial Number 522,559, filed March 14, 1931, and is only described in connection with this invention so that a full understanding of the application of the present invention may be had.

The cap 33 is rotated when the valve 17 is open in any suitable manner, but so far as the present invention is concerned, suffice it to say that a rod 66 is connected with the cap, and through the medium of a suitable yieldable connection 67 with the arm 18 of the valve 17 so that as the latter is rocked about its pivot 19, the rod 66 will be moved to rotate the cap 33.

The air inlet opening 11 is controlled by means of a choke valve 68 which is operated in any suitable manner, such as by means of an operating rod 69 that leads to a convenient position for the operator and is connected with the choke 68 by means of an arm 70.

With the present invention it will be manifest that an additional supply of fuel will be automatically delivered to the engine upon any drop of the suction or vacuum therein by the operation of the throtle valve, and the mechanism for thus delivering the supply is itself controlled by the suction or vacuum in the engine.

With the particular form of nozzle and controlling valve therefor, it will be manifest that there will be a continuous supply of air through the inlet opening 11, across the outlets of the openings 31 and 34, and that there will be a continuous atomization of the fuel. As an additional supply of air becomes necessary the valve 17 will

be opened by the suction created in the engine and this additional supply of air will pass over the top of the sleeve 28 into the throat of the carburetor. As the valve 17 is operated the cap 33 of the nozzle 29 will be correspondingly adjusted, so that the amount of fuel in proportion to the amount of air supplied will be automatically regulated.

Obviously, the choke valve 68 is normally held open and is only closed when starting the engine, the valve 68 being of such a size that when in its closing position, sufficient space will be left around the periphery of the valve so as to permit a supply of air to enter the carburetor and flow through the passages 38 across the nozzle.

It will be manifest that the travel of the plunger 55 is governed by the amount of drop of vacuum between the balance point between the tension of the spring 57 and the vacuum, and the varied opening of the throttle 62 will vary the amount of vacuum above the plunger. This variance in drop in vacuum controls the length of stroke of the plunger or piston 55 which automatically ejects the proper amount of fuel.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A carburetor embodying a fuel nozzle, means for causing an atomization of fuel therethrough, a cylinder having a discharge outlet, means connected with said outlet for injecting fuel through the said nozzle, a piston reciprocable in the cylinder, a connection between the cylinder on the side of the piston opposite to the side on which said outlet is located and the suction side of the engine, a spring operating upon the piston and tending to force the piston in a direction towards the outlet of the cylinder to force the fuel from the cylinder, the engine suction operating to move the piston away from said outlet and place the spring under tension, said spring operating to move the piston when the engine suction drops, and means for varying at will the tension of said spring.

2. A carburetor embodying a fuel nozzle, means for supplying fuel to the nozzle, a closed cylinder having a discharge outlet, an injector connected with the outlet for discharging fuel through said nozzle, a piston in the cylinder, a connection between the cylinder on the side of the piston on which said outlet is located and the suction side of the engine, a spring housed within the piston, the suction in the engine operating to move the piston in a direction to create a stress on the spring whereby when the engine suction drops, the spring will move the piston to force the fuel from the cylinder through the injector and the fuel nozzle, the said piston serving as a seal to the opening in the cylinder through which the engine suction is manifested, and means for varying at will the tension of said spring.

3. A carburetor embodying a fuel nozzle, means for supplying fuel to the nozzle, a cylinder having a discharge outlet directed through said nozzle, a piston in the cylinder, a connection between the cylinder on the side of the piston opposite to the side on which said discharge outlet is located, a spring operating upon the piston, the suction in the engine operating to move the piston against the stress of the spring, whereby upon a drop in engine suction the spring will operate to move the piston to discharge fuel from the cylinder and through said nozzle, and means for forming a fluid seal to the passage of fuel between the cylinder and piston.

4. A carburetor embodying a fuel nozzle, means for supplying fuel to the nozzle, a cylinder having a discharge outlet directed through said nozzle, a piston in the cylinder, a connection between the cylinder on the side of the piston opposite to the side on which said discharge outlet is located, a spring operating upon the piston, the suction in the engine operating to move the piston against the stress of the spring, whereby upon a drop in engine suction the spring will operate to move the piston to discharge fuel from the cylinder and through said nozzle, and means for admitting and confining outside air between the piston and cylinder wall to form a fluid seal to the passage of fuel therebetween.

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