July 13, 1943. G. R. ERICSON 2,323,984

CARBURETOR

Filed Dec. 26, 1940

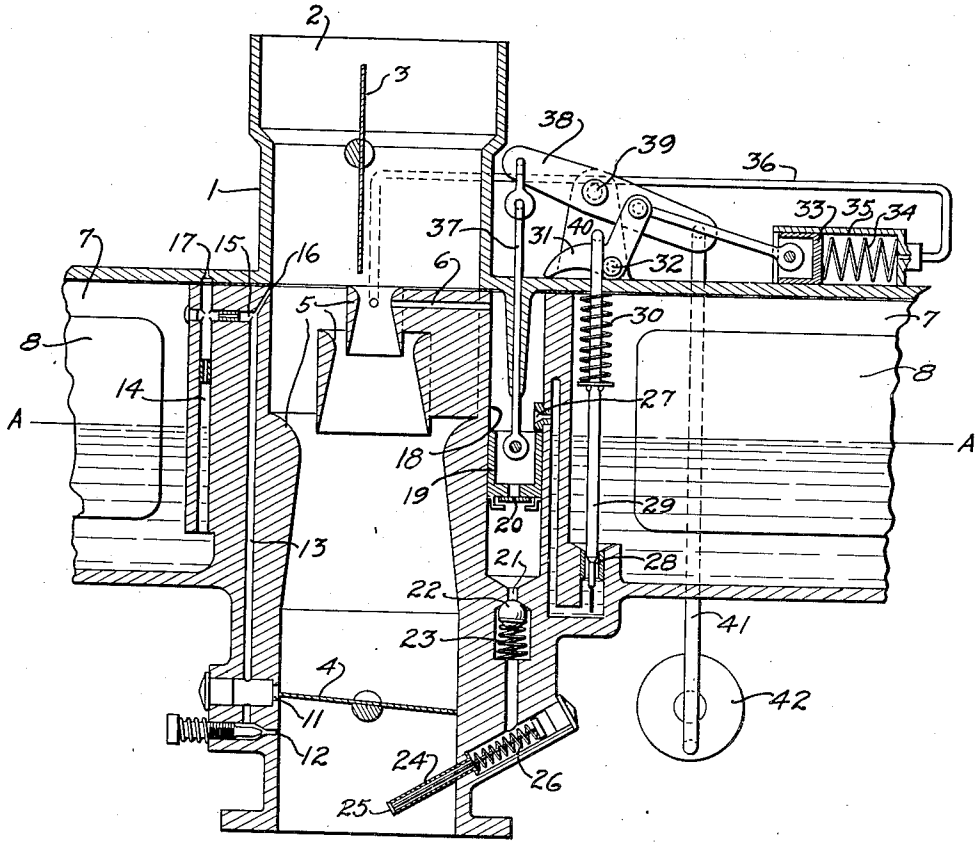



FIG. 1.

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Patented July 13, 1943

2,323,984

# UNITED STATES PATENT OFFICE

2,323,984

## CARBURETOR

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Application December 26, 1940, Serial No. 371,607

3 Claims. (Cl. 261—37)

This invention relates to internal combustion engine carburetors of the injection type and particularly concerns means for metering and injecting the fuel into the combustion supporting air. The object of the invention is to produce a fuel mixing and vaporizing device which is capable of supplying a more accurately metered and proportioned charge of fuel than has heretofore been possible and also to supply such fuel in response to lower suctions and manifold depressions so that the maximum operating efficiency of the engine can be obtained.

The invention will be better understood upon reference to the accompanying drawing which shows a diagrammatic sectional elevation of the invention.

The reference numeral 1 indicates the wall of an air passageway having an air inlet 2, choke valve 3 and throttle 4. A multiple Venturi suction increasing device 5 is mounted in the air passage and a suction passage 6 is connected to the suction multiplying device at the point of highest suction.

Fuel from a common source (not shown) is supplied to the conventional double float chamber 7 and maintained substantially at the level A—A by floats 8 and conventional inlet valve mechanism (not shown). The idling of the engine with the throttle in nearly closed position is accomplished by means of the idle ports 11 and 12 which connect with the float chamber by means of the idle passages 13, 14 and 15, suitable air bleeds for these passages being provided at 16 and 17.

When the engine is operating at low speed with the throttle in nearly closed position, all the fuel required by the engine is supplied in this manner. As the throttle is opened, the air flow through the air passage increases and gradually builds up suction which is applied to passageway 6. The passage communicates with the pump cylinder 18 in which is mounted a piston 19 having a downwardly opening check valve 20 at its head end. Fuel is discharged from the lower end of cylinder 18 through a port 21 and check valve 22, the check valve being lightly held in closed position by the spring 23. A discharge nozzle 24 having a spray valve 25 extends into the air passage at a point posterior to the throttle valve 4. This valve 25 is yieldably held in closed position by a fairly stiff spring 26, the spring being capable, however, of yielding to permit the forceable supplying of fuel out of the nozzle 24 on the down stroke of the piston 19. Fuel is drawn into the cylinder 18 through an orifice 27 by the suction communicated to chamber 18 through the passageway 6. A variable fuel metering orifice 28 controlled by the stepped and/or tapered metering rod 29 is provided to control the flow of fuel from the bowl 7 to the cylinder 18. The metering rod 29 is yieldably biased towards its lower or most restricting position by means of the spring 30 and is arranged to be lifted by the cam 31 which is pivoted at 32 and connected to the piston 33. This piston is yieldably pressed toward the left of the figure by the spring 34 but is movable against the spring by suction applied to cylinder 35 through section conduit 36 from the venturi 5.

The pump piston 19 is operated by a connecting rod 37 which is connected to a rocker arm 38. The rocker arm 38 is pivoted at 39 to a fixed support 40 and is operated by link 41 eccentrically connected to a rotating driving member 42. Any suitable means (not shown) for driving the member 42 may be employed, however, it is preferred that the rate at which the piston 19 is driven should be sufficient at the highest fuel flow to prevent accumulation of fuel in cylinder 18. The capacity of the pump 19 and the rate of its operation must be such that fuel can never accumulate in the cylinder 18 to such an extent that it may be drawn into the air passage through the suction passage 6. At low flows, however, some air will be drawn into cylinder 18 through the passageway 6 due to vacuum pumping above piston 19. Thus under conditions of low suction at venturi 5 a substantial amount of air will be drawn into cylinder 18 and be discharged along with the fuel down through the nozzle 24 and the spray valve 25.

In operation fuel for idling is supplied to the air passageway adjacent the edge of the throttling valve 4 through idling fuel passages 14 and 13 and discharge ports 11 and 12. During this operation the throttling valve will be in a nearly closed position and the suction in venturi 5, consequently, negligible. As a result no fuel will be drawn through orifice 27 to be injected into the air stream. The size of passageway 6 with relation to the size and speed of piston 19 must be such that the vacuum pumping above piston 19 will be satisfied by the back flow of air through passage 6 to such extent that fuel will not be lifted from the established fuel level through orifice 27 during this phase of operation.

As soon as throttle 4 is moved openward, however, and the velocity through venturi 5 reaches a point where the consequent pressure drop with-

holds back flow into cylinder 18 sufficiently; fuel will be lifted through orifice 27 due to the fact that the vacuum pumping of the piston is not sufficiently satisfied or bled out. It will be seen that as the suction in venturi 5 increases, more pull will be exerted on fuel orifice 27 and less bleeding or mixing air will be drawn through passage 6 to be mixed with the fuel to be injected. As the suction in venturi 5 increases, metering orifice 28 will be varied to permit a greater flow of fuel to the cylinder 18.

The foregoing description and accompanying drawing are intended to be illustrative and not limiting and the use of all such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a carburetor, a main air passageway, a throttling valve in said passageway, a venturi in said passageway anterior to the throttle, a fuel chamber, means for maintaining a substantially constant predetermined level of fuel in said chamber, a fuel well, a fuel passageway leading from said fuel chamber and communicating with said fuel well at a point above the predetermined level of fuel, a suction passageway leading from the upper part of said well above the level of fuel to said venturi, and a continuously operable fuel pumping device arranged to receive fuel from the lower part of said well and to discharge same under pressure into said air passageway.

2. In a carburetor, a main air passageway, a venturi in said passageway a throttle valve in said passageway, a source of fuel, a fuel well, a fuel passageway leading from said source of fuel and opening into the upper part of said fuel well, and a suction passageway connecting the upper part of said fuel well and said venturi at a point anterior to said throttle whereby fuel is drawn into said well from said source normally in proportion to the air flow, a continuously operable pump in the lower part of said well operating to withdraw all fuel entering said well and to discharge the same into said main air passageway, a regulable orifice in said fuel passageway, and a suction responsive device connected to and responsive to the suction in said main air passageway anterior to said throttle for regulating said orifice.

3. In a carburetor, a main air passageway, a venturi in said passageway anterior to the throttle, a throttling valve in said passageway, a fuel chamber, means for maintaining a substantially constant predetermined level of fuel in said chamber, a fuel well, a fuel passageway leading from said fuel chamber and communicating with said fuel well at a point above the predetermined level of fuel, a suction passageway leading from the upper part of said well above the level of fuel to said venturi, a continuously operable fuel pumping device arranged to receive fuel from the lower part of said well and to discharge same under pressure into said air passageway, and a conduit connecting the source of fuel to said main passageway at a point adjacent closed throttle position for supplying an idling mixture independent of said pump supply.

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