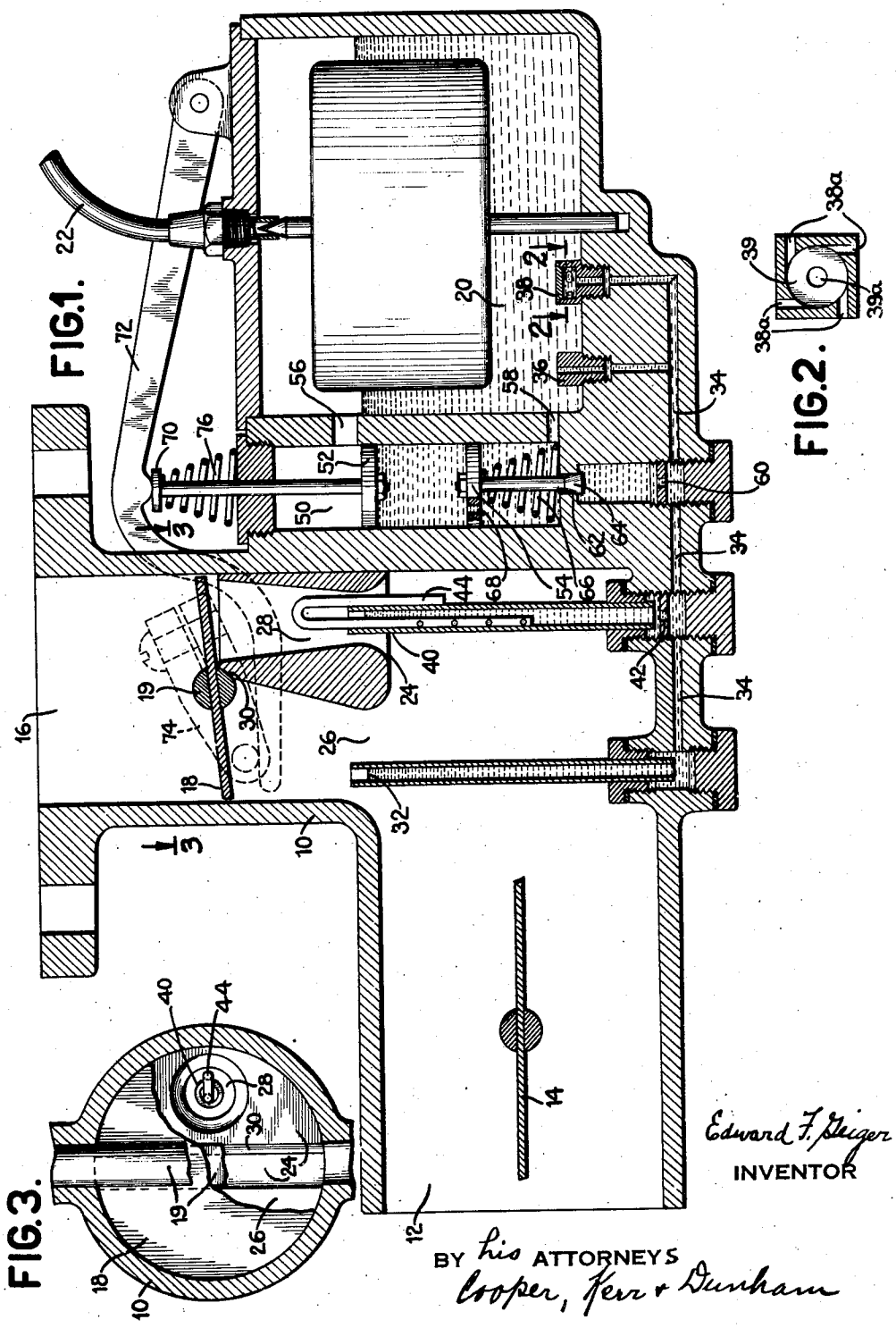
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CARBURETOR

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CARBURETOR

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8 Claims. (Cl. 261—34)

This invention relates to improvements in carburetors and in general the invention has for its objects the provision of a carburetor of comparatively simple construction which in operation will provide a relatively rich mixture under wide open throttle conditions and a more economical and lean mixture under relatively closed throttle conditions and at times when the engine is running under light loads.

A further object of the present invention resides in the provision of a carburetor which will efficiently perform its functions and in which auxiliary air valves and many other movable parts are dispensed with.

A further object of the present invention resides in the provision of a novel means for maintaining the proper proportions of air and fuel when the throttle valve is suddenly opened.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawing, which by way of illustration shows what I now consider to be preferred embodiments of the invention.

In the drawing:

Figure 1 shows a vertical sectional view of the carburetor;

Fig. 2 is a detail horizontal sectional view taken substantially on line 2—2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 1 and looking in the direction of the arrows.

The carburetor comprises a casing 10 having an air inlet 12, air choke valve 14, mixture outlet 16, throttle valve 18 and the usual constant level fuel supply reservoir 20 which is kept supplied with fuel through a pipe 22. Disposed in the casing 10 adjacent the throttle valve 18 and on the intake side thereof is a part 24 which, with the casing 10, provides a Venturi like passage 26 on one side of part 24. Passing through part 24 and parallel to the Venturi passage 26 but separate from the passage 26 is a second Venturi shaped passage 28. The arrangement is such that one venturi is comparatively larger than the other, venturi 26 being larger than venturi 28.

In one embodiment of the present invention the relative proportions of these two venturis have been made in the ratio of four to one. The part 24 extends up in proximity to the throttle valve and has a surface 30 which is arc shaped so as to form with the throttle valve stem, or shaft 19, a barrier to the flow of air or fuel mixture between the outlet sides of Venturi passages 26 and 28 when a relative difference in pressure exists in the outlets of these passages.

Disposed in the throat of Venturi passage 26 is a fuel nozzle 32 which through a common fuel supply passage 34 and fuel metering arrangement or orifice devices 36 and 38 communicates with the constant level fuel reservoir 20.

Extending up into the throat of venturi 28 is a fuel nozzle 40 which is in communication with the common fuel supply passage 34, through a fuel metering arrangement or orifice device 42. A conduit 44 is shown adapted to conduct air from ahead of the Venturi section 28 into the nozzle 40 for bleeding air into the fuel below the normal fuel level. A like conduit may be employed in conjunction with nozzle 32 for the same purpose. The fuel metering arrangement 36 is shown as a plug or head having a calibrated passage for the fuel, but if desired an adjustable needle valve may be substituted for this fixed orifice fuel metering device.

The fuel metering device 38 comprises a cylindrical chamber 39 (see Fig. 2) having one or more nozzle like entrances 38a for fuel and a fuel outlet 39a. The fuel entrance passages 38a enter the chamber 39 substantially tangentially to its cylindrical surface and the fuel outlet passage 39a leaves the chamber 39 substantially centrally with respect to its medial axis. When fuel flows through this device the nozzles 38a cause the fuel to rotate in the cylindrical chamber 39 and through a centrifugal reaction create a back pressure opposed to the flow of fuel, which back pressure increases as the square of the velocity of flow so as to cause a proportionately less than normal increase in fuel flow as the flow producing pressure head is increased. This fuel metering device is more fully described in and forms the subject matter of my copending application Serial No. 384,774, filed August 9, 1929 which matured into Patent 1,865,851 granted July 5, 1932.

While I have shown the fuel metering devices 36 and 38 acting in conjunction with each other, in certain cases it may be desirable to entirely dispense with one or the other of these metering devices and to use either 36 or 38 alone to meter the fuel entering the fuel supply conduit.

In carburetor practice it has been found that when the throttle valve is suddenly opened from a nearly closed position the flow of air reaches maximum proportions almost instantly, but the flow of fuel lags behind the air flow and builds up to its maximum proportions slowly. This for a moment forms a weak fuel mixture and may

cause the engine to stall or at best it causes the engine to respond slowly to the opening of the throttle. To counteract this effect an accelerating pump and valving device are provided that function only on rapid opening movement of the throttle and operate to instantly force an extra supply of fuel to the fuel nozzles to compensate for the first rush of air through the carburetor upon sudden opening of the throttle. This device also for a moment maintains an extra passage for fuel while normal fuel flow is being established through the regular passages. This accelerating pump and its associated devices will now be described.

Referring to the drawing, 50 is a cylinder containing pistons 52 and 54. The cylinder 50 communicates with the main fuel passage 34 through a metering orifice 60 and a fuel passage 62. Disposed in cylinder 50 is a piston 54 provided with a stem with an enlarged end 64 arranged to close passage 62 when piston 54 is in its extreme upper position. A spring 66 is provided to press piston 54 to its upper position. A calibrated bypass passage 68 is provided to allow fuel to pass from one side of piston 54 to the other side. Piston 52 likewise has a stem with a head portion 70 arranged to engage a lever 72 which cooperates with camming devices 74 attached to the throttle valve stem 19. With this arrangement an opening movement of the throttle will positively force piston 52 downward against the force of the spring 76. This spring 76 presses the piston 52 upward and tends to keep its stem head 70 in engagement with the lever 72. A bypass 56 is also provided from the cylinder 70 into the top of the float chamber. The action of this arrangement is as follows: When the throttle valve 18 is suddenly opened the piston 52 is positively forced downward at a rate which is faster than the fuel can bypass piston 54 through the calibrated bypass passage 68 and the hydraulic pressure produced in the fuel between the pistons 52 and 54 forces piston 54 downward. This downward movement of 54 pushes stop 64 out of passage 62 and through the calibrated orifice 60 forces fuel into the main fuel passage 34. The pressure which is available for forcing the fuel through passage 62 depends upon the size of the passage 58. The distance the piston 54 is forced downward depends upon the degree of opening movement of throttle valve 18. When the throttle opening movement ceases the spring 66 will force piston 54 back to its upward position but the movement of this piston will be delayed due to the necessity of the fuel between the two pistons 52 and 54 bypassing piston 54 through passage 68. While this upward movement of 54 is taking place passage 62 remains open allowing extra fuel to flow from chamber 20 through passages 58, 62 and 60 and into passage 64, thus augmenting the fuel supply normally derived through the metering heads 36 and 38.

It has been previously explained that venturi 28 is smaller than venturi 26 and in one embodiment of the present invention has been made about one quarter the size of venturi 26. When the throttle 18 is slightly opened, the throttle, which cooperates with both venturis, will exert a predominating control over the flow of air passing through both venturis and the volume of air passing through venturi 28 will approximately equal the volume of air passing through venturi 26. However, the pressure upon the outlet of nozzle 40 will be relatively lower than the pressure of the outlet at nozzle 32 on account of the relative size of the two venturis. The predominating supply of fuel will then pass through 40 and the flow through this nozzle can be set for a lean economical mixture by means of fuel metering device 42. When the throttle is in wide open position the manifold pressure is practically applied without restriction directly to both venturis 26 and 28, and 26 being larger more air will flow through 26 than through 28. In fact, practically four times as much air will flow with the four to one area ratio of the two venturis. The suction at the outlet of nozzle 32 will then equal the suction at the top of nozzle 40 and a relatively rich mixture will be supplied because 32 contains no restriction and is a relatively larger tube than 40 which is restricted at 42.

At intermediate positions of the throttle intermediate results are obtained.

It will be noted that the flow through both of the nozzles 32 and 40 is controlled by the fuel metering devices 36 and 38. By properly proportioning and calibrating these fuel metering devices a proper fuel mixture can be obtained for all operating air speeds with open throttle. The centrifugal metering head 38 permits the making of a rich mixture at low air speeds and furnishes a less rich mixture proportionately as the air speed is increased. The rate of decrease in richness can be changed by changing the relative proportions of the passages 36 and 38 so as to increase or decrease the proportion of fuel that flows through the centrifugal head 38.

What I claim is:

1. A carburetor having a throttle and fuel nozzle devices, means for supplying additional fuel to the fuel nozzle devices upon rapid accelerating opening movement of the throttle, said means comprising a common cylinder and a pair of pistons both slidably cooperating with said common cylinder for operation therein, one piston being positively operated by and upon a rapid opening movement of the throttle, the second piston having a bypass passage therethrough and being operated by hydraulic action from said first piston, a valve operated by said second piston upon hydraulic operation of said second piston by said first piston, said valve upon opening movements delivering additional fuel to the aforesaid nozzle devices.

2. An accelerating fuel pump for a carburetor comprising a cylinder, a piston therein positively operated in one direction by a throttle opening operation, a second piston slidably operating in the same cylinder with the aforesaid piston and spaced therefrom and adapted for hydraulic operation by said first mentioned piston and spring biased towards the same, a fuel valve operated by said second piston when the latter is operated by the first mentioned piston, a bypass through said second piston and a calibrated fuel passage to feed fuel from below said second mentioned piston for delivery through the aforesaid valve.

3. A carburetor provided with a pair of venturis and a fuel nozzle extending through the throat of each venturi, a fuel supply passage for both of said nozzles, a fuel metering orifice intermediate one of said nozzles and said passage, and a plurality of fuel metering orifices leading from a source of fuel supply to said fuel supply passage, one of said orifices leading to an accelerating pump, the other of said orifices communicating directly with the source of fuel supply.

4. A carburetor comprising a pair of separate venturis with a fuel nozzle extending to the throat of each venturi, a common throttling

means for controlling mixture flow through both venturis and common fuel metering means for controlling at all times and under all running conditions all fuel flow to all nozzles under the resultant suction developed at the throats of the separate venturis, said common fuel metering means including means to cause the fuel flow to increase at a lesser rate than the increase would be through a simple orifice as suction is increased.

5. A carburetor comprising a pair of separate venturis with a fuel nozzle extending to the throat of each venturi, a common throttling means for controlling mixture flow through both venturis, common fuel metering means for controlling at all times and under all running conditions all fuel flow to all nozzles under the resultant suction developed at the throats of the separate venturis, and means for temporarily augmenting the amount of fuel supplied to the fuel nozzles upon sudden opening of the throttle.

6. An accelerating pump for a carburetor with a fuel reservoir, a cylinder, a piston positively operated therein in one direction by a throttle opening operation, a second piston in said cylinder adapted for hydraulic operation by said first mentioned piston and spring biased toward the same, a bypass through said second mentioned piston, a second bypass affording communication between the cylinder at a point below the second mentioned piston and the fuel reservoir, a fuel valve operated by said second mentioned piston when the latter is operated by the first mentioned piston to provide delivery of supplemental fuel to a fuel passage beyond the valve, said fuel delivery of supplemental fuel being effected at the pressure existing in the cylinder between the bypass through the second piston and the second bypass to the fuel reservoir.

7. A carburetor comprising a pair of separate venturis with a fuel nozzle extending to the throat of each venturi, a common throttling means for controlling mixture flow through both venturis, and common fuel metering means for controlling at all times fuel flow to all nozzles under the resultant suction developed at the throats of the separate venturis, said common fuel metering means including two calibrated orifices extending to a fuel reservoir with one orifice comprising a centrifugal fuel flow metering device to cause the fuel flow to increase at a lesser rate than the increase would be through a simple orifice as suction is increased.

8. A carburetor comprising a pair of separate venturis, a common throttling means for controlling mixture flow through both venturis, a pair of fuel nozzles receiving fuel from a fuel passage for delivery to both venturis, one nozzle receiving fuel flow from said passage through a metering orifice, common fuel metering means for controlling at all times and under all running conditions all fuel flow to all nozzles under the resultant suction developed at the throats of the separate venturis, said common fuel metering means metering the said fuel passage from a reservoir and including means to cause the fuel flow to increase at a less rate than the increase would be through a simple orifice as suction is increased and means for temporarily augmenting the amount of fuel supplied to the passage and therethrough to the fuel nozzles upon sudden opening of the throttle.

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