April 7, 1936. J. DOLZA 2,036,465

CARBURETOR

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Fig. 1

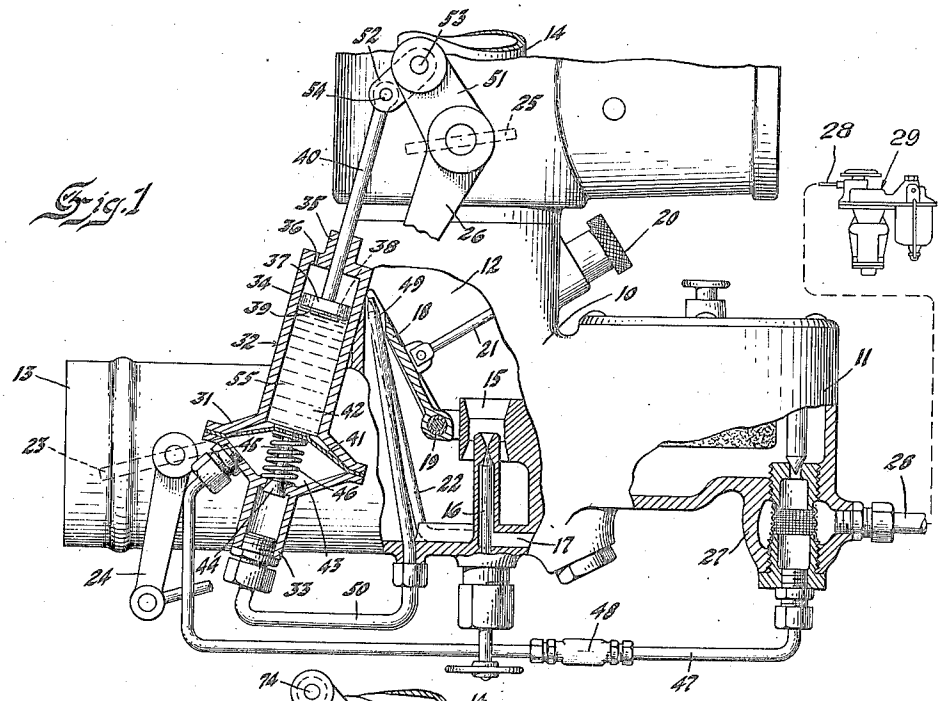
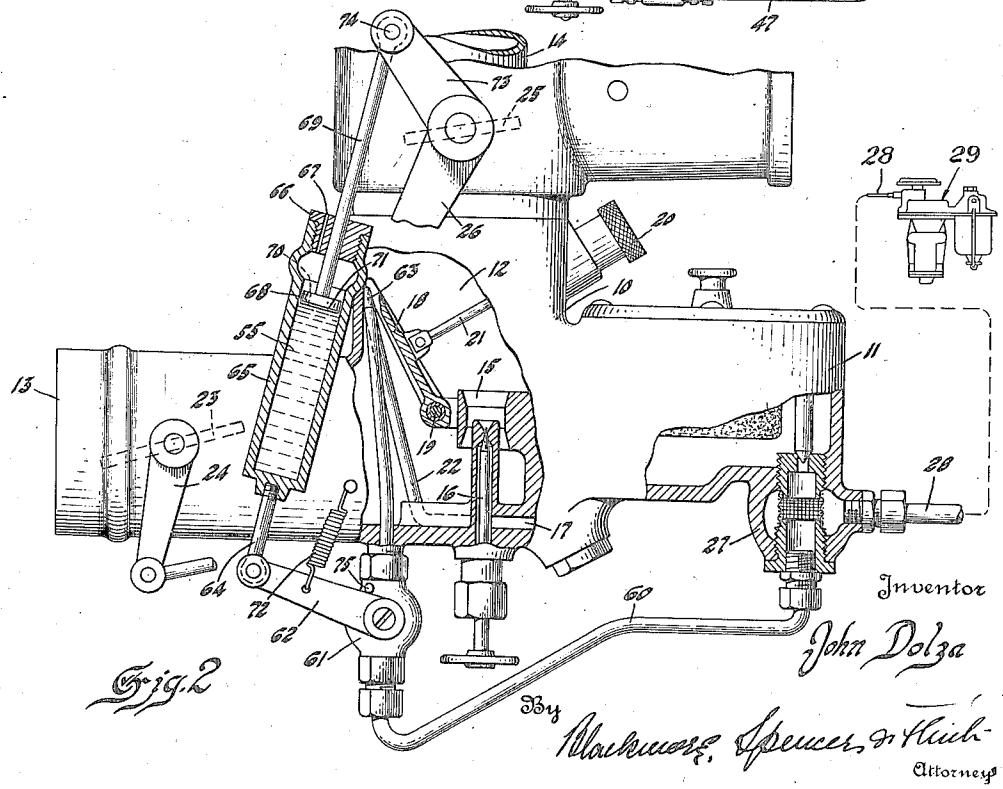


Fig. 2



Inventor

John Dolza

By Mackaye, Spencer & Hirsh

Attorneys

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CARBURETOR

John Dolza, Flint, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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9 Claims. (Cl. 261—34)

This invention relates to carburetors of the type which are used to prepare and supply a combustible mixture of fuel and air to the cylinder or the cylinders of an internal combustion engine.

The invention resides in the provision, in a carburetor of the type described, of means for supplying to the mixture passage of the carburetor an increased amount of fuel during acceleration periods in order to make possible rapid and smooth acceleration of the engine on which the carburetor is installed. One of the principal features of the invention resides in the provision of means, of the type described in the preceding sentence, which is so constructed and arranged that the increased amount of fuel which is supplied to the mixture passage of the carburetor during acceleration periods will be greater when the engine is cold than when it is warm.

For a more complete understanding of the nature of my invention, and for a description of the preferred embodiments thereof which are illustrated in the accompanying drawing, reference is made to the following specification and to the appended claims.

In the accompanying drawing:

Figure 1 is a side elevation, with parts broken away and in section, of a carburetor in which is incorporated one embodiment of my invention.

Figure 2 is a side elevation, with parts broken away and in section, of a carburetor in which is incorporated another embodiment of my invention.

In the drawing there is shown a carburetor which includes an elbow shaped body 10, and a float bowl 11 which is formed integrally with the body. Through the body extends a mixture passage 12, into which air is adapted to enter at 13, and from which a combustible mixture of fuel and air is adapted to be discharged into the intake manifold through the riser 14. In an intermediate portion of the passage 12, there is located a Venturi tube 15 into which extends the discharge end of the "low speed" nozzle 16 which is supplied with fuel from the float bowl through the passage 17. Within the passage 12, there is also located an air valve 18, which is pivoted to the body as indicated at 19, and which is normally held closed by a spring located in the dash-pot 20 and acting on the valve through a piston (within the dash-pot), and the piston rod 21. A "high speed" nozzle 22, which is also supplied with fuel from the float bowl, has its discharge end located adjacent and below the free end of the air valve 18 in such a position that the discharge of fuel therefrom is controlled by the position of the valve.

In the horizontal branch of the passage 12, there is located a butterfly "choke" valve 23, which is adapted to be moved from open to closed position and vice versa by means of the arm 24, and, in the riser 14, there is located a throttle valve 25 which is adapted to be moved from open to closed position and vice versa by means of the arm 26.

There is provided on the float bowl 11 a hollow boss 27 which communicates with the interior of the float bowl and into which opens a pipe 28 through which fuel is adapted to be conducted to the float bowl from a suitable fuel pump 29 which is preferably arranged to be driven by the engine on which the carburetor is installed.

When the carburetor is installed on an engine and the engine is operating at "idle" speed, the air valve 18 remains closed and fuel is supplied to the mixture passage 12 solely from the "slow speed" nozzle 16. However, as the suction increases the air valve 18 is opened, and suction is applied to the "high speed" nozzle which causes fuel to be delivered therefrom into the mixture passage 12.

To supply an increased amount of fuel to the mixture passage during acceleration periods so as to make rapid acceleration of the engine possible, I provide, in the form of the invention illustrated in Figure 1, a pump which is suitably secured to the body of the carburetor. The pump includes a housing 31, which consists of upper and lower parts 32 and 33 which are secured together with their flared ends in juxtaposition, as shown in the drawing. In the cylindrical portion 34 of the upper housing part, of which the upper end is closed by a head 35 through which extends a small vent opening 36, there is located a piston 37 which fits rather loosely in the cylinder and through which extend openings 38 controlled by a flap valve 39. Secured to the piston 37 and extending therefrom through the head 35 to a point outside of the cylinder 34 is a piston rod 40.

Between the meeting edges of the flared portions of the pump housing parts, there are clamped the edges of a flexible diaphragm 41, which is made of a suitable impermeable material, and which divides the interior of the housing 31 into upper and lower compartments 42 and 43. A suitable valve 44, which is normally seated on the edges of the portion of the lower housing part which surround the opening between the cylindrical and the flared portions thereof, is provided with a stem 45, which extends into the portion of the interior of the pump housing between the flared portions of the upper and lower housing parts and is secured to the central portion of the diaphragm 41. A coil spring 46, which surrounds the valve stem 45, tends, at all times, to bow the diaphragm 41 upwardly and to maintain the valve 44 seated so as to prevent communication between the upper and lower portions of the lower compartment 43.

To conduct fuel from the pipe 28 into the lower compartment of the pump housing, there is provided a pipe 47, which opens at one end into the interior of the boss 27 and at its opposite end into the upper portion of the lower compartment 43. To prevent discharge of fuel from the lower compartment of the pump housing through the pipe 47, there is provided a check valve 48.

To conduct fuel from the lower compartment of the pump housing to the nozzle 49, from which fuel is adapted to be discharged into the mixture passage 12 at a point adjacent that at which fuel is discharged thereinto from the "high speed" nozzle 22, there is provided a pipe 50 which communicates at one end with the lower end of the cylindrical portion of the lower housing part 33 and at its opposite end with the lower end of the nozzle 49.

To operate the pump upon movement of the throttle valve 25, there is provided an arm 51 which is integral with the throttle valve operating arm 26, and a link 52 which is pivotally connected to the arm 51 and 53 and to the piston rod 40 at 54. In order that the pump may function at all engine speeds, the length of the arm 51 should be such that the distance through which the pivot 53 travels in a direction parallel to the axis of the cylinder 34 as the throttle valve is moved from fully closed to fully opened position is substantially equal to or is less than the distance between the lower end of the piston 37 and the lower end of the cylinder 34 when the throttle valve is in fully closed position.

Before the engine on which the carburetor is installed is started, sufficient liquid 55, preferably oil, of the type of which the viscosity increases as its temperature is lowered and decreases as its temperature is raised, to fill the space between the diaphragm 41 and the lower end of the piston 37 when the throttle valve is in fully closed position is placed in the upper compartment 42 of the pump housing. During operation of the engine, the fuel pump 29 which is connected to the pipe 28 maintains a supply of fuel in the float bowl 11 and keeps the lower compartment of the pump housing filled with fuel. It will be understood, of course, that the spring 46 is of sufficient strength to keep the valve 44 closed against the pressure of the fuel forced into the lower compartment 43 by the fuel pump 29. When the throttle valve is opened to start the engine, or when, with the engine operating at any given speed, the throttle valve is further opened to increase the speed of the engine, the piston 37 is moved downwardly in the cylinder 34 and, through the intermediary of the volume of liquid 55 and the diaphragm 41, opens the valve 44 and forces fuel from the lower compartment of the pump housing through the nozzle 49 into the mixture passage 12 and thus supplies the increased amount of fuel which is desired during acceleration periods. As the piston moves downwardly in the cylinder, a quantity of the liquid 55 which varies inversely with the viscosity of the liquid and, therefore, with the temperature of the liquid leaks between the side walls of the cylinder and the piston, into the portion of the cylinder 34 which is above the piston, which causes the amount of fuel supplied to the mixture passage 12 through the nozzle 49 to vary inversely with the temperature of the engine. This leakage of the liquid 55 past the piston continues, even after downward movement of the piston has ceased, until the spring 46 causes the valve 44 to be seated and interrupts communication between the upper and lower portions of the lower compartment 43 of the pump housing.

When, with the engine operating at any given speed, the throttle valve is moved toward closed position, the piston 37 is moved upwardly in the cylinder 34 and any of the liquid 55 which has collected above the piston drains through the openings 38 into the portion of the upper compartment 42 which is below the piston.

The carburetor which is shown in Figure 2 of the drawing differs from that which is shown in Figure 1 only in the means for supplying additional fuel to the mixture passage during acceleration periods. To the parts of the carburetor which are the same as the corresponding parts of the carburetor shown in Figure 1, the same reference characters have been applied, and, for this reason, a description of these parts will be unnecessary.

The means for supplying additional fuel to the mixture passage 12 of the carburetor shown in Figure 2 during acceleration periods includes a pipe 60 connected at one end to the boss 27, in the same manner as the pipe 47 is connected to the boss 27 in Figure 1, and opening at its opposite end into the interior of a valve casing 61 in which is located a suitable valve adapted to be operated by the arm 62 to control the passage of fuel through the interior of the valve casing. The lower end of a nozzle 63, from which fuel is adapted to be discharged into the mixture passage 12 at a point adjacent that at which fuel is discharged thereinto from the "high speed" nozzle 22, communicates with the interior of the valve casing on the side of the valve opposite that on which the pipe 60 is connected thereto so that the valve controls the passage of fuel from the pipe 60 into the nozzle 63.

To the free end of the arm 62 is pivoted a rod 66 on the upper end of which is carried a cylinder 65 of which the upper end is closed by a head 66 through which extends a vent opening 67. A piston 68, to which is rigidly secured a piston rod 69 which extends through the head to a point outside of the cylinder, and through which extends an opening 70 controlled by a flap valve 71, is fitted rather loosely in the cylinder.

To open the valve, which controls the passage of fuel from the pipe 60 into the nozzle 63 and which is normally closed by a spring 72 which is secured to the arm 62 and the body of the carburetor, as the throttle valve is opened to increase the speed of the engine, there is provided an arm 73 which is integral with the throttle valve operating arm 26 and which is connected by a pivot pin 74 to the outer end of the piston rod 69. For reasons, which will be obvious, the effective length of the arm 73 should be such that the distance, through which the pivot 74 travels parallel to the axis of the cylinder as the throttle valve is moved from fully closed to fully opened position, is substantially equal to or is less than the distance between the lower end of the piston 68 and the lower end of the cylinder 65 when the throttle valve is in fully closed position.

Before the engine on which the carburetor is installed is started, sufficient liquid 55, of the type hereinbefore described, to fill the space within the cylinder 65 between the bottom thereof and the lower end of the piston 68 when the throttle valve is in fully closed position is placed in the cylinder 65. During operation of the engine, the fuel pump 29 maintains a supply of fuel in the float bowl 11 and in the pipe 60.

When, with the engine operating at any given speed, the throttle valve is further opened to increase the speed of the engine, the piston rod 69, and, through the intermediary of the piston 68 and the body of liquid 55, the cylinder 65, and the rod 64 are moved downwardly. Downward movement of the rod 64 moves the valve operating arm 62 against the resistance of the spring 72 and establishes communication between the pipe 60 and the nozzle 63, with the result that the fuel pump 29 forces fuel from the pipe 60 into the nozzle 63 and therefrom into the mixture passage 12, thus supplying the additional amount of fuel desired during acceleration periods.

As hereinbefore intimated, the force necessary to move the valve operating arm 62 to a position in which communication is established between the pipe 60 and the nozzle 63 is transmitted to the arm 62 through the intermediary of the body of liquid 55 by the pressure of the piston 68 on the upper surface of the liquid. As a consequence of this application of pressure to the surface of the liquid, a portion of the liquid 55 is forced between the piston 68 and the walls of the cylinder 65 into the portion of the cylinder above the piston. As hereinbefore explained, the volume of the liquid 55 which thus leaks around the piston will vary inversely with the temperature of the engine and, consequently, the amount that the valve, which controls communication between the pipe 60 and the nozzle 63, is opened and the amount of fuel supplied to the passage 12 through the nozzle 63 will vary inversely with the temperature of the engine. Leakage of liquid 55 from the lower to the upper side of the piston 68 will continue, even after movement of the throttle valve has ceased, due to the tendency of the spring 72 to move the valve operating arm 62 to the position in which the valve is closed, until the arm abuts against the stop 75 and the valve is closed and communication between the pipe 60 and the nozzle 63 is interrupted.

When, with the engine operating at any given speed, the throttle valve is moved toward closed position, the piston 68 is moved upwardly in the cylinder 65 and any of the liquid 55 which has collected above the piston drains through the opening 70 into the portion of the cylinder below the piston.

Although I have shown and described preferred embodiments of my invention, it is to be understood that this has been done merely by way of example, and not by way of limitation, and that the scope of my invention is limited only by the appended claims.

I claim:

1. In a caburetor, a fuel pump which includes a housing, a flexible diaphragm within the housing, a valve secured to the diaphragm, and means to flex the diaphragm.

2. In a carburetor, a fuel pump which includes a housing, a flexible diaphragm within the housing, a valve secured to the diaphragm, and means to flex the diaphragm including, a body of liquid of which the viscosity decreases as its temperature increases, and a piston adapted to exert pressure on the body of liquid.

3. In a carburetor, a mixing chamber, a throttle valve, a pump which includes a housing for injecting fuel into the mixing chamber, a flexible diaphragm within the housing, and means including a body of liquid on which pressure is exerted when the throttle valve is opened to flex the diaphragm and inject fuel into the mixing chamber when the throttle valve is opened.

4. The invention claimed in claim 3, plus a valve secured to the diaphragm.

5. In a carburetor, a throttle-operated pump for supplying fuel to the mixture passage of the carburetor and which includes a housing, a flexible diaphragm within the housing, a valve to control the discharge of fuel from the pump secured to the diaphragm, and means to flex the diaphragm including, a body of liquid, and a piston operatively associated with the throttle and adapted to exert pressure on the body of liquid.

6. In a fuel supply system, a carburetor having a mixing chamber and a fuel reservoir, common means for supplying fuel to the fuel reservoir for normal operation and accelerating fuel to the mixing chamber under pressure, and manually operable means responsive to temperature variations for controlling the discharge of accelerating fuel into the mixing chamber.

7. In a fuel supply system, a carburetor having a mixing chamber and a fuel reservoir, a fuel pump furnishing fuel to the carburetor under pressure, a connection from the pump to the fuel reservoir for supplying the normal fuel requirements of the carburetor, a connection from the pump to the mixing chamber for supplying auxiliary fuel thereto under pressure, and manually operable means differentially operative under temperature variations for controlling said named connection.

8. In an internal combustion engine, a mixing chamber, a throttle valve to regulate the flow of combustible mixture from the mixing chamber to the engine, mechanism for maintaining fuel under pressure during operation of the engine, a passage through which fuel may be advanced into the mixing chamber by virtue of the pressure exerted on it by the mentioned mechanism, a fuel valve in the passage, and means through which the fuel valve is moved toward its opened position when the throttle valve is moved toward its opened position, the last mentioned means including a thermo-sensitive element so constructed and arranged that the volume of fuel advanced into the mixing chamber through the mentioned passage when the throttle valve is moved toward its opened position a given extent varies inversely with the temperature.

9. In an internal combustion engine, a mixing chamber, a throttle valve to regulate the flow of combustible mixture from the mixing chamber to the engine, mechanism for maintaining fuel under pressure during operation of the engine, a passage through which fuel may be advanced into the mixing chamber by virtue of the pressure exerted on it by the mentioned mechanism, a fuel valve in the passage, and means through which the fuel valve is moved toward its opened position when the throttle valve is moved toward its opened position, the last mentioned means being so constructed and arranged that the fuel valve may move to its closed position without movement of the throttle valve and including a thermo-sensitive element so constructed and arranged that the volume of fuel advanced into the mixing chamber through the mentioned passage when the throttle valve is moved toward its opened position a given extent varies inversely with the temperature.

JOHN DOLZA.