

Dec. 19, 1961

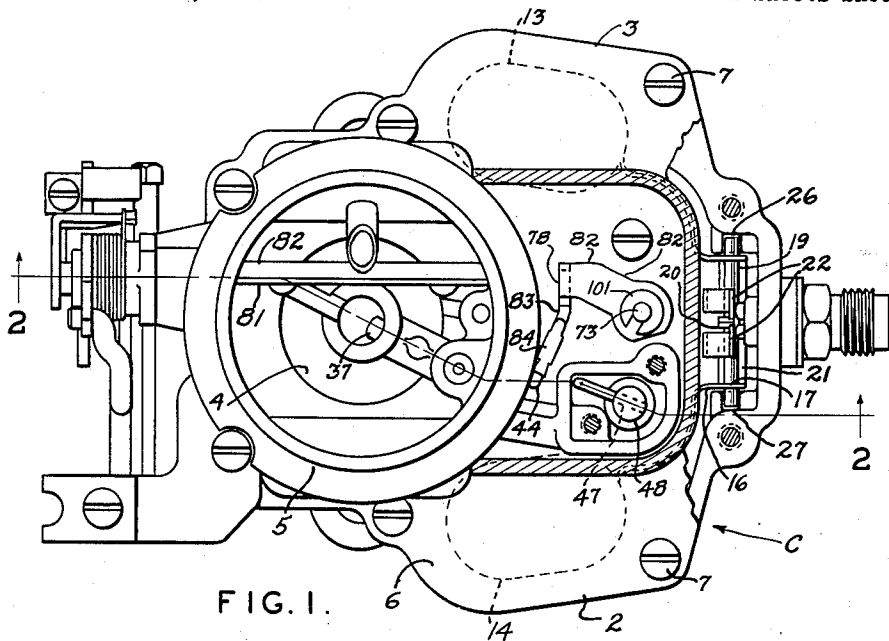
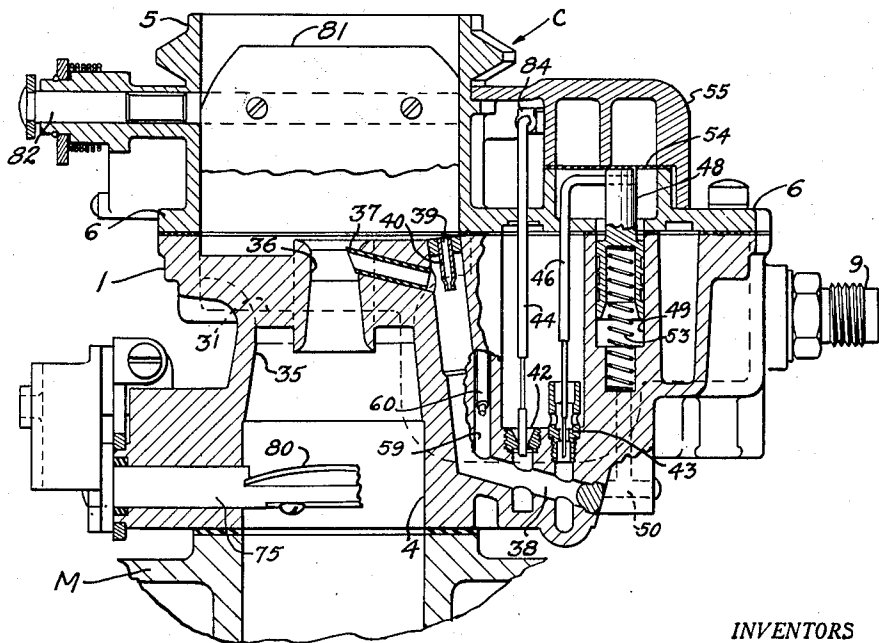
R. E. KALERT, JR., ETAL

3,013,779

CARBURETOR

Filed March 17, 1960

2 Sheets-Sheet 1



INVENTORS
RALPH E. KALERT JR.
JESSE L. SZWARGULSKI

BY

Charles H. Bassett
ATTORNEY

ATTORNEY

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R. E. KALERT, JR., ETAL
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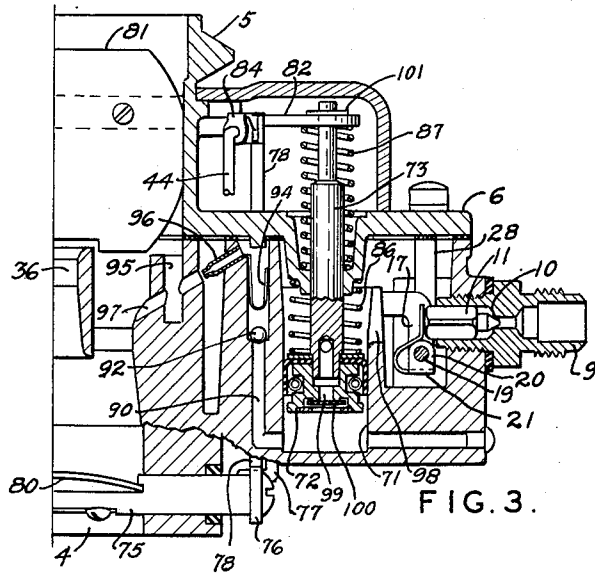


FIG. 3.

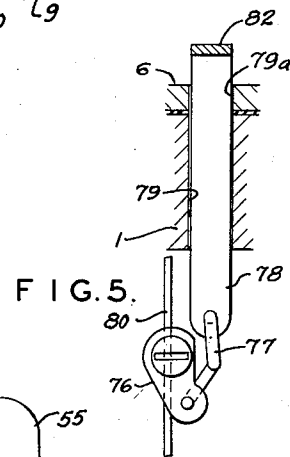


FIG. 5.

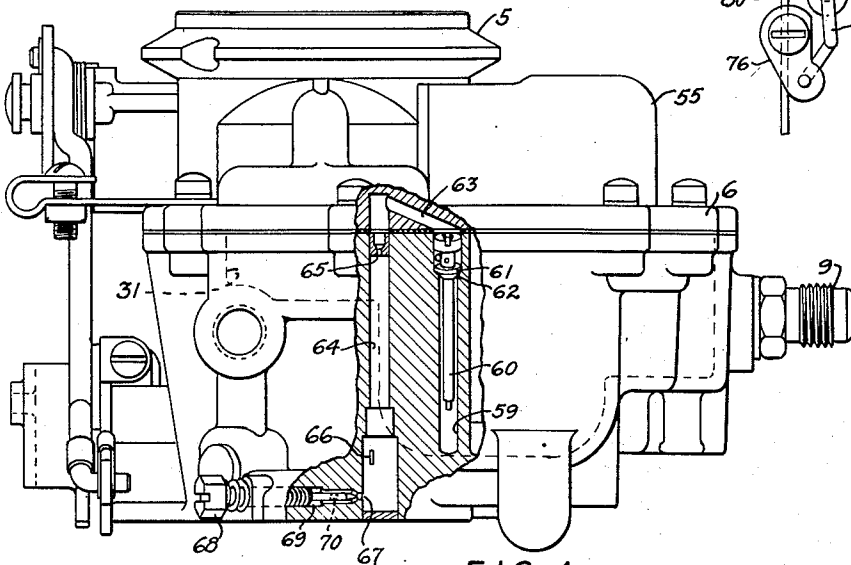


FIG. 4.

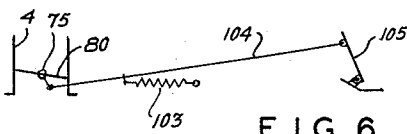


FIG. 6.

INVENTORS
RALPH E. KALERT JR.
JESSE L. SZWARGULSKI

BY

Charles H. Bassett
ATTORNEY

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3,013,779

CARBURETOR

Ralph E. Kalert, Jr., Granite City, Ill., and Jesse L. Szwargulski, Florissant, Mo., assignors to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

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12 Claims. (Cl. 261—34)

This invention relates to carburetors for internal combustion engines and, more particularly, to a carburetor provided with an accelerating pump operable responsive to throttle movement to enrich the fuel mixture during acceleration.

Heretofore, carburetors provided with accelerating pumps operable responsive to throttle movement have been provided with a compression spring to move a piston on its discharge stroke responsive to opening of the throttle to enrich the fuel mixture supplied to the engine during acceleration, the piston being moved in the opposite direction by means of a throttle actuated linkage when the throttle is moved from open to closed position by means of a conventional throttle return spring.

On the return stroke of an accelerating pump of this type, the throttle actuated linkage and pump are subjected to binding forces tending to produce excessive friction and wear of parts. It is, therefore, an object of the invention to provide a carburetor embodying means for reducing friction and wear of parts of the throttle actuated linkage and accelerating pump.

Another object of the invention resides in the provision of a carburetor accelerating pump embodying a return compression spring adapted to overcome the force exerted by the piston discharge spring to move the piston through its return stroke responsive to closing of the throttle.

A further object of the invention resides in the provision of a pump piston return spring surrounding the piston stem and adapted to be compressed between the throttle actuated linkage and a fixed seat on the carburetor responsive to opening of the throttle to thereby permit the piston discharge spring to move the piston for its discharge stroke.

The invention embodies other novel features, details of construction and arrangement of parts which are hereinafter set forth in the specification and claims and illustrated in the accompanying drawings, forming part thereof, wherein:

FIG. 1 is a top plan view, partly in section, illustrating a carburetor embodying features of the invention.

FIG. 2 is a section taken along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary section illustrating the accelerating pump structure as embodied in a carburetor.

FIG. 4 is a side elevation, partly in section, illustrating the carburetor.

FIG. 5 is a fragmentary view showing the linkage interconnecting the throttle valve and accelerating pump.

FIG. 6 is a schematic view illustrating a linkage interconnecting an accelerator pedal and the throttle valve of the carburetor.

Referring now to the drawings for a better understanding of the invention, the carburetor, indicated generally at C, is shown as mounted on an intake manifold M of an internal combustion engine. The carburetor comprises a main body section 1 formed with fuel bowls 2 and 3 and a mixture conduit 4. An air horn 5 provides an air inlet for the mixture conduit 4, and is formed with a float bowl cover 6 adapted to be secured to the main body section 1 by means of screws 7.

A needle valve body 9 is threaded into the main body section 1 for the passage of fuel from a source of fuel to the fuel bowls 2 and 3. The valve body 9 is formed with

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a valve seat 10 for engagement by a needle valve member 11 to control the flow of fuel to the bowls, the valve member being actuated by floats 13 and 14 to maintain a constant fuel level within the bowls. The floats are secured to similar individual arms 16—16, each arm having a vertical leg 17 spaced from a bearing portion 20 by a lateral portion 21. Coaxial bearing apertures are formed in the leg 17 and bearing portion 20 of each arm to receive a hinge pin 19. Each lateral portion 21 is provided with a finger 22 to engage the valve member 11 when its respective float moves upwardly.

Slots 26 and 27 are formed in the fuel bowl to receive the ends of the hinge pin 19 which is secured against displacement by means of a retainer 28 mounted on the bowl cover 6 and having its ends disposed in the slots 26 and 27 to engage the ends of the hinge pin.

A main venturi 35 and a primary venturi 36 are provided within the mixture conduit 4, and a main fuel nozzle 37 extends from a main supply passage 38 into the primary venturi. The upper end of the passage 38 is vented at 39 to the mixture passage inlet through a small vent tube 40 which extends downwardly below the entrance to the main fuel nozzle. Fuel is supplied from the fuel bowls to the supply passage 38 through metering orifices 42 and 43 provided with stepped metering rods 44 and 46, respectively. The metering rod 44 is mechanically connected to a throttle valve 30 mounted on a shaft 75 journaled in the main body section 1, the particular mechanism for operating the rod 44 being hereinafter described.

The upper end of the metering rod 46 is bent laterally for engagement within a hole 47 formed in a step-up piston 48. The piston is mounted in a cylinder 49 connected to the mixture conduit 4 posterior to the throttle valve 30 by a passage 50. A spring 53 is mounted in the cylinder 49 to urge the piston to its upper position against a gasket 54 secured between the cover 6 and a removable dust cap 55. The position of the piston 48 within the cylinder 49 varies with manifold pressure to regulate the flow of fuel through the orifice 43.

The idle fuel system comprises a passage 59 leading from the fuel bowls and containing an idle tube 60 having a flange 61 seated at 62 at the upper end of the passage. The passage 59 is connected to a passage 63 leading to a vertical passage 64 containing a metering orifice 65. An idle port 66 leads from the passage 64 into the mixture conduit 4 adjacent the edge of the throttle valve. A port 67 leads from the passage 64 to a passage 69 connected to an idle port 70 posterior of the throttle valve, the port 67 being provided with an idle adjustment screw 68.

The carburetor is provided with an accelerating pump structure which is shown as comprising a cylinder 71 formed in the main body section 1 between the fuel bowls 2 and 3 to receive a piston 72 having a stem 73 extending upwardly through an opening in the float bowl cover 6. The upper end portion of the stem above the cover 6 is of reduced diameter at 74 and has a stop collar 101 secured thereto in spaced relation from a shoulder 102.

A lever 76 is secured to the throttle shaft 75 and formed with an aperture at its free end to receive one end of an S-shape link 77 formed from a length of wire stock of circular section. The other end of the link 77 is engaged in an aperture formed in the lower end of a pull rod 78 guided for vertical reciprocable movement in slots 79 and 79a formed in the main section 1 and cover 6, respectively.

The upper end of the pull rod 78 is formed with a pair of arms 82 and 83, the latter arm being connected to the metering rod 44 by means of a spring clip 84. The arm 82 is formed with an aperture to slidably receive

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the reduced diameter portion 74 of the piston stem 73. A helical compression spring 86 is engaged between the cover 6 and the piston 72 to urge the piston downwardly, and a relatively stronger helical compression spring 87 is engaged between the cover 6 and the arm 82 of the pull rod 78 to overcome the force exerted by the spring 86 to thereby move the piston upwardly responsive to movement of the throttle valve 80 toward its closed position.

A fuel discharge passage 90 leads from the lower end of the cylinder 71 to a nozzle 96 disposed to discharge fuel through coaxial windows 97-97 into the mixture conduit 4, the windows having an air bleed 95 therebetween. An outlet ball check valve 92 is provided in the passage 90 for limited movement upwardly from its seat into contact with a U-shape wire retainer 94 during discharge of fuel from the cylinder 71.

The upper end of the cylinder 71 is supplied with fuel from the fuel bowls 2 and 3 through an opening 98 in the wall of the cylinder. A fuel inlet passage 99 extends through the piston 72 and a portion of the stem 73 for the passage of fuel into the cylinder below the piston as the latter moves upwardly, the passage being provided with an inlet check valve 100.

During operation of an engine, the throttle valve 80 is biased toward its closed position by means of a tension spring 103 acting through a mechanical linkage 104, as illustrated in FIG. 6. The throttle valve is moved from its closed or idle position toward its open position by manual operation of an accelerator pedal 105.

During movement of the throttle valve to open position, the lever 76 acts through the link 77 and pull rod 78 to compress the spring 87 between the arm 82 and the cover 6 and thereby permit the spring 86 to move the piston 72 downwardly in the cylinder to discharge fuel through the passage 90 and nozzle 96 into the mixture conduit.

When the operator releases the accelerator pedal 105, the springs 87 and 103 coact to return the throttle valve 80 to its closed position. The spring 87 also acts to move the piston 72 upwardly through its suction stroke and to compress the relatively weaker spring 86 between the piston 72 and the cover 6.

Certain structures have been described herein which will fulfill all the objects of the present invention, but it is contemplated that other modifications will be obvious to those skilled in the art which come within the scope of the invention as defined by the appended claims.

We claim:

1. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from said fuel bowl into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge compression spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return compression spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve, said linkage being movable relative to said pumping member, said pump return spring being operable to compress said pump discharge spring to move said pumping member in said other direction, said pumping member having a stem, and said springs surrounding said stem.

2. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel

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from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from said fuel bowl into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge compression spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, a pump return compression spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve, said linkage being movable relative to said pumping member, said pump return spring being operable to compress said pump discharge spring to move said pumping member in said other direction, said pumping member having a stem, and said springs surrounding said stem, and abutment means on the end of said stem for engagement by said linkage.

3. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, an accelerating pump structure comprising a cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder and movable in the other direction to draw fuel into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve.

4. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, an accelerating pump structure comprising a cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder and movable in the other direction to draw fuel into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve, said pumping member having a stem including an abutment shoulder, said linkage having an arm provided with an opening to slidably receive said stem, said arm being movable into engagement with said shoulder responsive to closing of said throttle valve.

5. In a carburetor, a throttle valve, an accelerating pump structure comprising a cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder and movable in the other direction to draw fuel into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve.

6. In a carburetor, a throttle valve, an accelerating pump structure comprising a cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder and movable in the other direction to draw fuel into said cylinder, a mechanical linkage in-

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terconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve, said pumping member having a stem, and said springs being coaxial and surrounding said stem on opposite sides of said spring seat.

7. In a carburetor, a throttle valve, an accelerating pump structure comprising a cylinder, a reciprocable pumping member movable in one direction to discharge fuel from said cylinder and movable in the other direction to draw fuel into said cylinder, a mechanical linkage interconnecting said throttle valve and said pumping member, a fixed spring seat member, a pump discharge spring interposed between said spring seat member and said pumping member to bias the latter in said one direction responsive to opening of said throttle valve, and a pump return spring interposed between said spring seat member and said mechanical linkage to bias said pumping member in said other direction responsive to closing of said throttle valve, said pumping member having a stem, and said springs being coaxial and surrounding said stem on opposite sides of said spring seat, said return spring being relatively stronger than said discharge spring.

8. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pump member in said pump cylinder including a stem and a piston movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from the fuel bowl into said cylinder, a fixed spring seat member, a pump discharge compression spring interposed between said spring seat member and the pumping member to bias the latter in one direction to discharge fuel from said cylinder into said mixture conduit, a mechanical linkage interconnecting said throttle valve and said pumping member, said mechanical linkage having a one-way connection with said stem for operating said pump member in a direction to draw fuel from the fuel bowl into said cylinder, a pump return compression spring interposed between said spring seat and said mechanical linkage, said return compression spring being compressible by operation of said linkage for throttle opening movement, whereby upon such movement by said linkage said pump discharge compression spring operates said accelerating pump in a direction for discharge of fuel from said cylinder.

9. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pump member in said cylinder including a projecting stem, said pump member being movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from the fuel bowl into said cylinder, a lateral projection at the outer end of said stem, a spring seat medially of said stem, linkage between said throttle valve and said stem, said linkage having a portion engaging the under face of said projection to move said pumping member in a direction to draw

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fuel into said cylinder when said throttle is moved toward closed position, a first compression spring between said spring seat and said pumping member to normally urge the latter in a direction to discharge fuel from said cylinder, a second compression spring between said spring seat and the under face of the linkage portion engaging the under face of said projection to normally urge said linkage portion against said projection, said second compression spring being disabled by compression upon movement of said linkage toward throttle opening movement, whereby said first spring will function to cause said pumping member to unload said cylinder.

10. The structure of claim 9 characterized in that a third spring is provided to assist the second spring in drawing fuel into the cylinder and compressing said first spring.

11. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pump member in said cylinder movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from the fuel bowl into said cylinder, a first spring means normally urging said pump member in a direction to discharge fuel from said cylinder, a second spring means normally urging said pump member in a direction to draw fuel into said cylinder, linkage means connected with said throttle and operable to actuate said pump member in a direction to draw fuel into said cylinder when said throttle is moved toward closed position, said linkage having a connection with said second spring operable to disable the latter to render the same ineffective to urge said pump member in a direction to draw fuel into said cylinder as the throttle moves toward open position, whereby said first spring is effective to urge said pump member in a direction to discharge fuel from said cylinder.

12. In a carburetor, a mixture conduit for supplying a mixture of fuel and air to an engine, a throttle valve in said conduit, a fuel bowl, a fuel system for supplying fuel from said bowl to said mixture conduit, an accelerating pump cylinder, a reciprocable pump member in said cylinder movable in one direction to discharge fuel from said cylinder into said mixture conduit and movable in the other direction to draw fuel from the fuel bowl into said cylinder, a fixed spring seat member, a pump discharge compression spring between said seat member and pump member to bias the latter in one direction to discharge fuel from said cylinder to said mixture conduit, a mechanical linkage interconnecting said throttle valve and said pumping member, said mechanical linkage having a one-way connection with said pump member to operate the latter to draw fuel into said pump chamber when the throttle valve is moved toward closed position, a pump return compression spring normally engaging said linkage to urge the latter in a throttle closing direction, said pump return compression spring being disabled upon movement of said linkage in a throttle opening position, whereby said pump discharge compression spring may operate said pump member to discharge the fuel in said pump chamber.

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