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CARBURETOR

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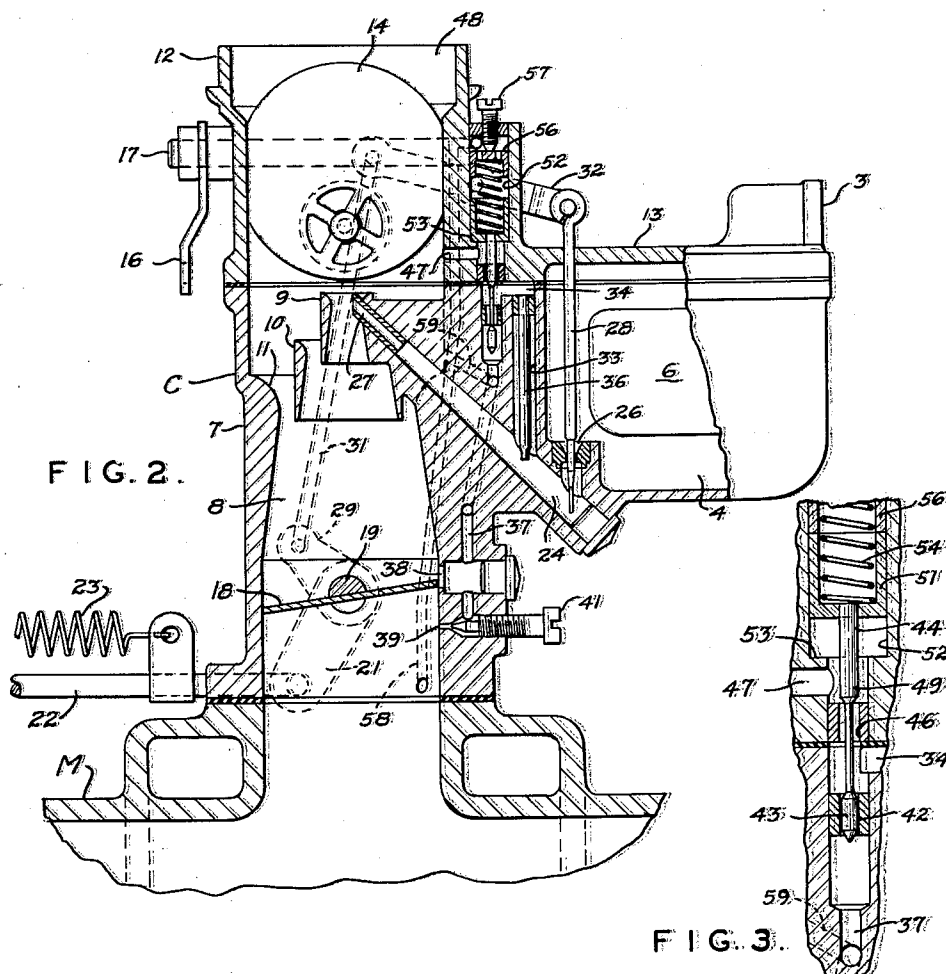
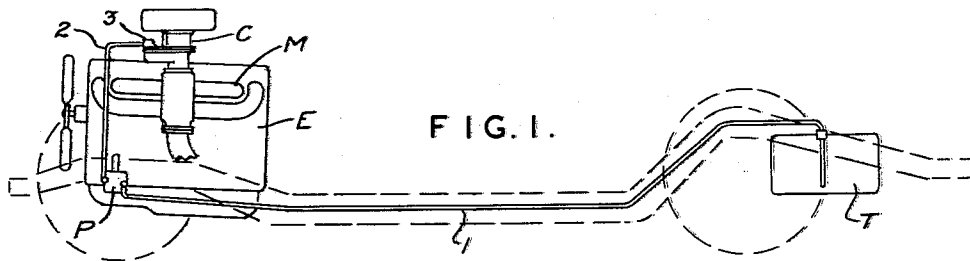


FIG. 3.

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## CARBURETOR

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This invention relates to carburetors for internal combustion engines, and more particularly to a carburetor provided with means for obtaining greater efficiency of operation and a reduction in the quantity of unburned hydrocarbons discharged to atmosphere during deceleration of the engine.

During idling operation of a vehicle engine, a proper mixture of fuel and air is provided by the idle fuel system of conventional carburetors to satisfy engine requirements. However, during rapid deceleration of a vehicle engine with the throttle valve closed, it is well known in the art that a larger quantity of fuel is drawn into the engine than will be burned, and causes a waste of fuel and contamination of the atmosphere.

It is, therefore, an object of the invention to provide a carburetor which is more efficient in operation and adapted to reduce the quantity of unburned hydrocarbons discharged to atmosphere during deceleration of an engine.

Another object of the invention resides in the provision of a carburetor provided with means responsive to intake manifold suction for controlling the fuel-air mixture supplied by the idle fuel system to the engine.

A further object of the invention resides in the provision of an idle fuel system provided with means for leaning out the fuel mixture supplied to the engine during deceleration.

Another object of the invention resides in the provision of a carburetor idle fuel system provided with an idle fuel control means and an idle air control means, and common means to actuate said control means responsive to suction posterior to the throttle to lean out the fuel mixture during deceleration.

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

FIG. 1 is a schematic view showing an engine powered vehicle provided with a carburetor embodying features of the invention.

FIG. 2 is a vertical section illustrating the carburetor.

FIG. 3 is an enlarged fragmentary view illustrating the control means for the idle fuel system.

Referring now to the drawing for a better understanding of the invention, the carburetor C is shown as mounted on the intake manifold M of an engine E which is secured to the chassis of a conventional automobile. An engine driven pump P is provided to move fuel from a tank T through conduits 1 and 2 to the fuel inlet 3 of the carburetor fuel bowl 4. A conventional needle valve provided in the inlet 3 is actuated by a float 6 to maintain a substantially constant fuel level within the fuel bowl.

The fuel bowl 4 is shown as formed on the main body section 7 of a single-bore downdraft carburetor, the body section 7 being provided with a mixture conduit 8 having venturies 9, 10 and 11 therein. An air horn section 12 is secured to the main body section 7 and provided with an integral fuel bowl cover 13. A choke valve 14 provided in the air horn section is adapted to be actuated by either manual or automatic choke mechanisms connected to lever 16 secured to the choke valve shaft 17.

A throttle valve 18 is provided in the outlet end of the mixture conduit 8 and secured to a shaft 19 journaled in

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the main body section 7. A lever 21 is secured to the shaft 19 for engagement by a linkage 22 connected to a conventional accelerator pedal adapted to be manually actuated to open the throttle valve, the valve being biased toward its closed position by a throttle return spring 23.

The carburetor is provided with a main fuel system which is shown as comprising a main fuel passage 24 supplied with fuel from the fuel bowl 4 through a metering orifice 26. A nozzle 27 is provided at the upper end of the passage 24 to discharge fuel into the upper venturi 9. A stepped fuel metering rod 28 is provided to control the flow of fuel through the orifice 26, and is actuated by a mechanical linkage comprising a throttle lever 29, link 31, and a pivotally mounted rocker arm 32.

The idle fuel system is shown as comprising a well 33 extending upwardly from the lower end of the main fuel passage 24 and terminating at its upper end at a cross passage 34. An idle tube 36 is mounted in the well 33 for the flow of fuel upwardly therethrough from the main passage 24 to the cross passage 34. An idle fuel passage 37 leads downwardly from the cross passage 34 to a first idle port 38 adjacent the edge of the throttle valve 18 and a second idle port 39 posterior to the throttle valve. The port 39 is provided with the usual idle adjustment screw 41.

To effect greater economy of operation and a reduction in the quantity of unburned hydrocarbons exhausted to atmosphere, the idle fuel system is provided with an idle fuel and air mixture metering orifice 42 in the upper end of the idle fuel passage 37 adjacent the cross passage 34 to receive an idle mixture metering portion 43 formed on a piston stem 44. The stem 44 extends upwardly through an idle air metering orifice 46 in an air passage 47 leading from the air inlet passage 48 to the idle fuel and air mixture passage 37, and is formed with an idle air metering portion 49.

The stem 44 is secured to a piston 51 mounted for reciprocative movement in a cylinder 52 formed in the air horn section 12. The piston 51 is normally biased downwardly against an annular stop shoulder 53 by means of a helical compression spring 54 mounted on an apertured spring seat member 56 adjustably positioned within the cylinder 52 by an adjustment screw 57. A suction passage 58 leads from the upper end of the cylinder 52 to the mixture conduit 8 posterior to the throttle valve 18. A calibrated air bleed passage 59 leads from the air inlet passage 48 to the idle fuel passage 37.

In the operation of the carburetor, fuel is supplied to the engine by the idle fuel system when the throttle valve 18 is closed, the fuel passing from the fuel bowl 4 to the main passage 24 and then through the idle tube 36, passages 34 and 37, and idle ports 38 and 39 to the mixture conduit 8. During operation, the piston 51 is held against the shoulder 53 by the spring 54.

When the throttle valve 18 is in its open position, fuel is supplied to the engine from the main fuel system, the fuel passing from the fuel bowl 4 through the metering orifice 26 and main fuel passage 24 for discharge from the nozzle 27 into the venturi 9 to mix with the air passing downwardly from the air inlet 48.

During rapid deceleration of the vehicle, the throttle valve 18 is closed, and the engine is driven by and serves as a brake for the vehicle. Due to the high vacuum in the intake manifold during deceleration, the piston 51 is forced upwardly (see FIG. 3) to move the fuel metering portion 43 on the piston stem into the idle fuel orifice 42 to restrict the flow of fuel and air passing therethrough to the idle ports 38 and 39. During such upward movement of the piston 51, the idle air metering portion 49 on the piston stem is moved out of the idle air orifice 46 to increase the flow of air into the idle fuel passage 37

to lean out the idle fuel mixture being supplied to the engine.

By thus leaning out the fuel mixture during rapid deceleration, less unburned hydrocarbons are exhausted to contaminate the atmosphere. It will be noted that a relatively lean fuel mixture is also desirable during rapid deceleration to provide a wet manifold to prevent stalling or stumbling of the engine upon subsequent opening of the throttle valve.

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.

I claim:

1. In a carburetor for an internal combustion engine, a mixture conduit, a source of fuel, a throttle valve in said conduit, an idle fuel system for supplying fuel to said conduit posterior to said throttle valve, said fuel system having a fuel and air mixture metering orifice and an air metering orifice, a fuel passage for supplying fuel from said fuel source to said fuel and air mixture metering orifice, an air passage upstream of the throttle valve and connected to the mixture conduit for supplying air to said air metering orifice, a passage connecting the fuel and air mixture metering orifice and the air metering orifice, means responsive to suction posterior of said throttle valve during engine deceleration for reducing the ratio of fuel to air flowing through said orifices to lean out the fuel and air mixture supplied to the engine, said suction responsive means comprising a stem extending through said mixture and air metering orifices respectively, said stem having spaced mixture and air metering portions respectively adjacent to said mixture and air metering orifices for movement into and out of the respective mixture and air metering orifices upon axial movement of said stem, and a suction motor to actuate said stem.

2. In a carburetor for an internal combustion engine, a mixture conduit, a source of fuel, a throttle valve in said conduit, an idle fuel system for supplying fuel to said conduit posterior to said throttle valve, said fuel system having a fuel and air mixture metering orifice and an air metering orifice, a fuel passage for supplying fuel from said fuel source to said fuel and air mixture metering orifice, an air passage upstream of the throttle valve and connected to the mixture conduit for supplying air to said air metering orifice, a passage connecting the fuel and air mixture metering orifice and the air metering orifice, means responsive to suction posterior of said throttle valve during engine deceleration for reducing the amount and the ratio of fuel to air flowing through said mixture orifice to lean out the fuel mixture supplied to the engine, said suction responsive means comprising a stem extending through said mixture and air metering orifices respectively, said stem having spaced mixture and air metering portions respectively adjacent to said mixture and air metering orifices for movement into and out of the respective mixture and air metering orifices upon reciprocal movement of said stem, said mixture and air metering stem portions each being of a size different than said stem to provide varying flow through said orifices respectively, and a suction motor to actuate said stem.

3. In a carburetor for an internal combustion engine, a mixture conduit, a source of fuel, a throttle valve in said

conduit, an idle fuel system for supplying fuel to said conduit posterior to said throttle valve, said fuel system having a fuel and air mixture metering orifice and an air metering orifice, a fuel passage for supplying fuel from said fuel source to said fuel and air mixture metering orifice, an air passage upstream of the throttle valve and connected to the mixture conduit for supplying air to said air metering orifice, a passage connecting the fuel and air mixture metering orifice and the air metering orifice, means responsive to suction posterior of said throttle valve during engine deceleration for varying the ratio of fuel to air flowing through said mixture orifice to lean out the fuel and air mixture supplied to the engine, said suction responsive means comprising a cylinder, a piston in said cylinder, a stem on said piston extending through said mixture and air metering orifices, spaced mixture and air metering portions on said stem adjacent respectively to said mixture and air metering orifices, said mixture and air metering stem portions being of a size different than said stem to provide control of flow through said mixture and air metering orifices respectively upon movement of said mixture and air metering stem portions into said respective mixture and air metering orifices, a passage leading from said cylinder to said mixture conduit posterior to said throttle valve, a compression spring yieldably resisting movement of said piston, and an adjustable spring seat in said cylinder engaging said spring.

4. In a carburetor for an internal combustion engine, a mixture conduit, a source of fuel, a throttle valve in said conduit, an idle fuel system for supplying fuel to said conduit posterior to said throttle valve, said idle fuel system having a fuel and air idle mixture metering orifice and an air metering orifice, a fuel passage for supplying fuel from said fuel source to said fuel and air mixture metering orifice, an air passage upstream of the throttle valve and connected to the mixture conduit for supplying air to said air metering orifice, a passage connecting the fuel and air mixture metering orifice and the air metering orifice, means responsive to suction posterior of said throttle valve during engine deceleration for reducing the amount of fuel and air flowing through said idle mixture orifice, said suction responsive means including a stem extending through said mixture and said air metering orifices and having a plurality of spaced metering portions of different sizes adjacent to said metering orifices for movement respectively into said mixture metering and air metering orifices to vary flow therethrough, and a suction motor means joined to said stem and having a conduit to said mixture conduit posterior to said throttle valve, said spaced metering stem portions arranged so that in one position of said stem said air orifice is opened a greater amount and said mixture orifice is opened a lesser amount than in a second position of said stem.

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