

Oct. 29, 1963

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3,109,043

CARBURETOR

Filed May 2, 1960

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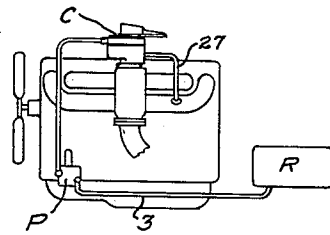


FIG. 1.

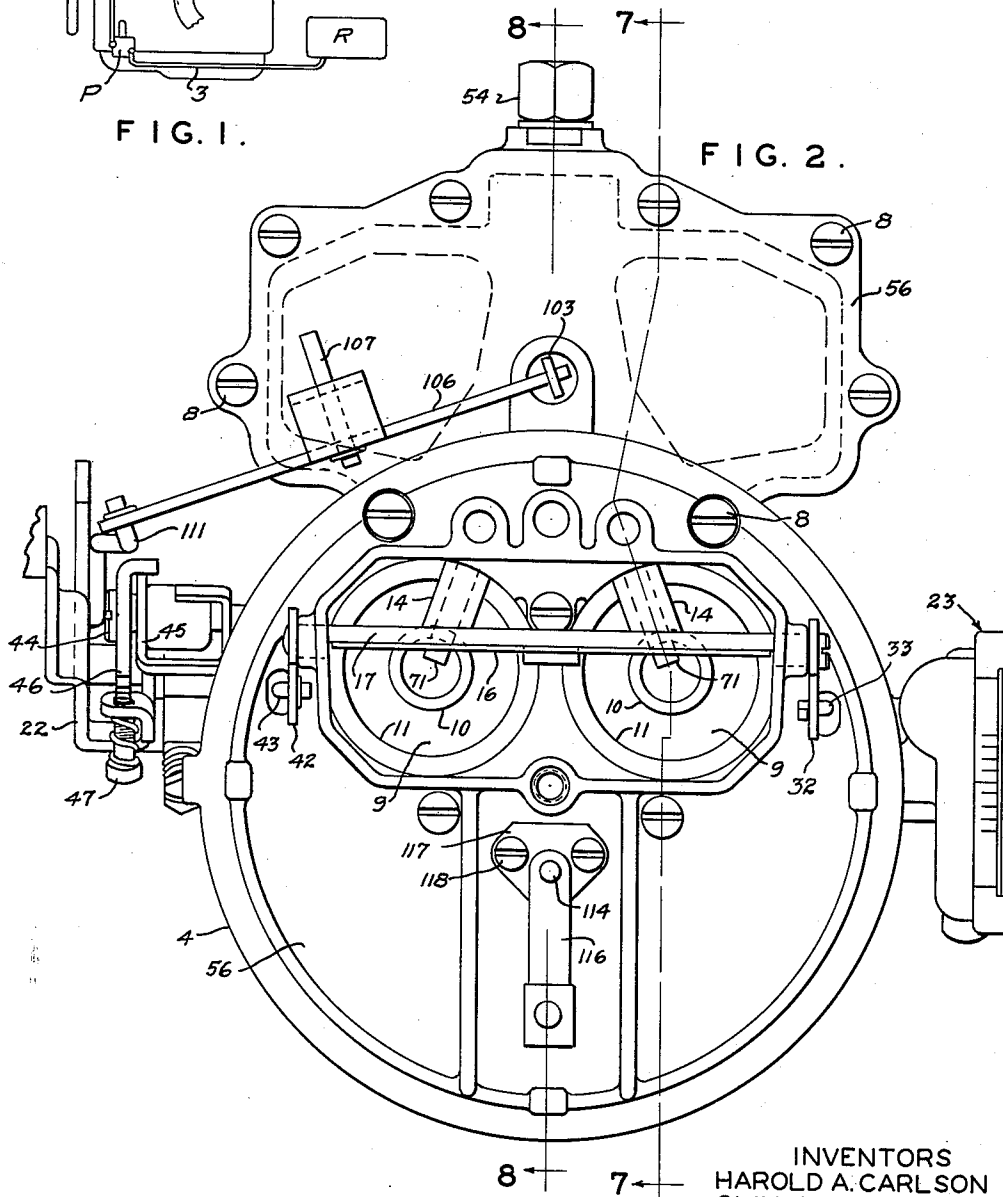


FIG. 2.

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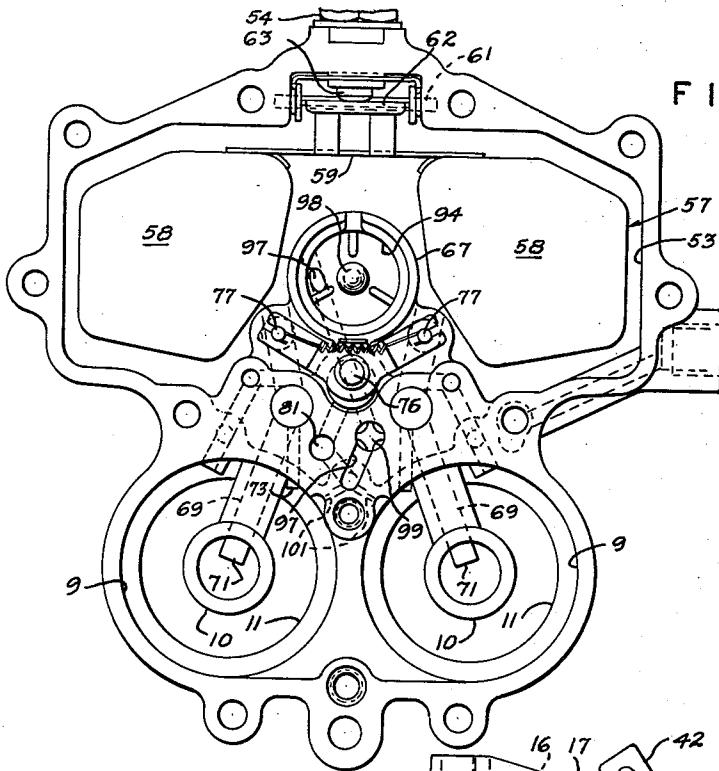


FIG. 3.

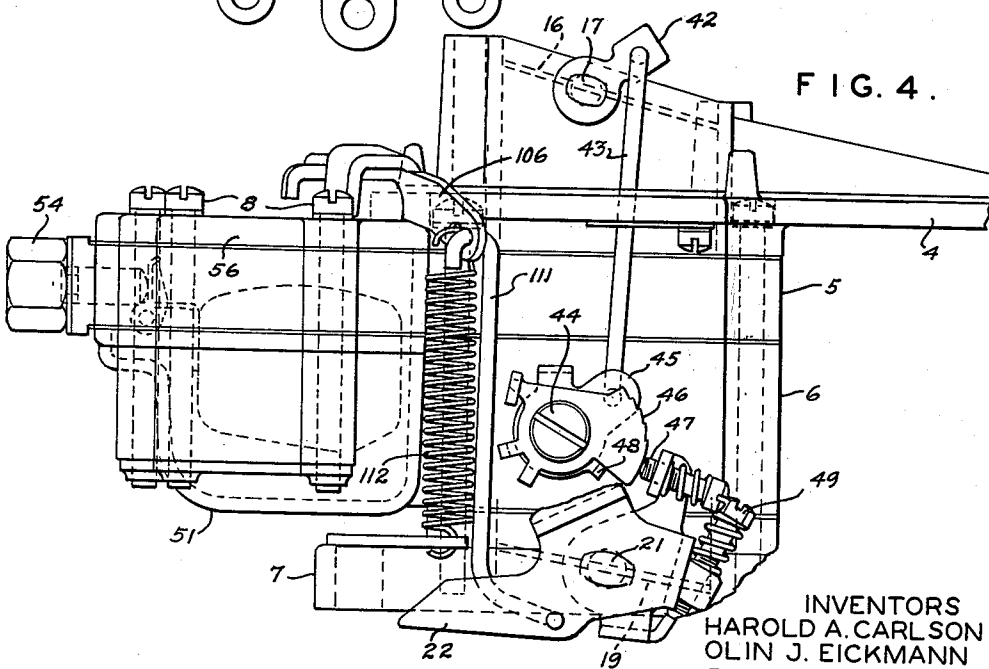


FIG. 4.

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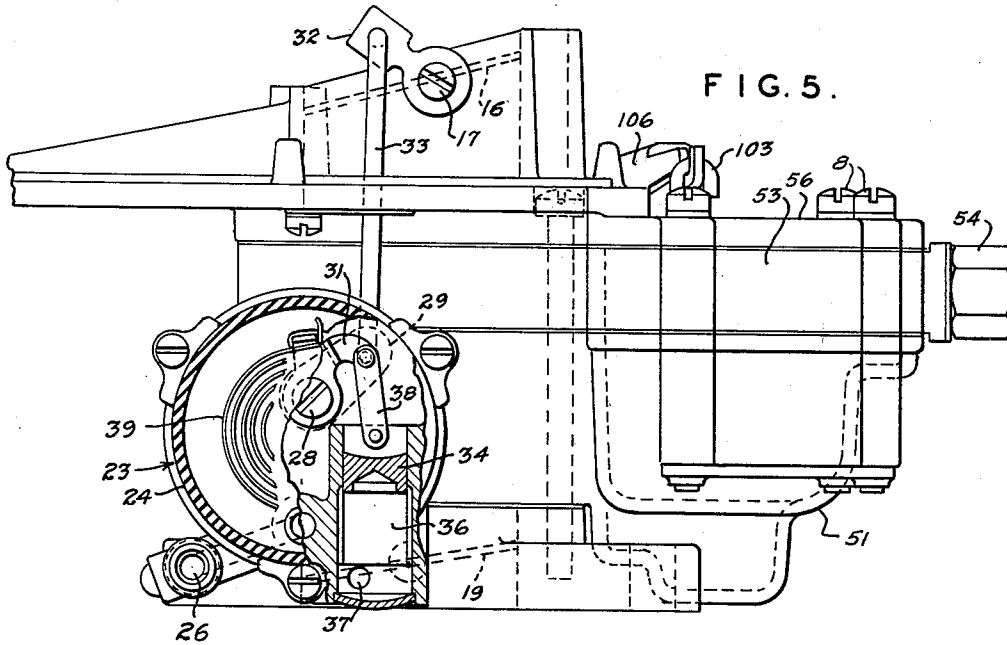


FIG. 5.

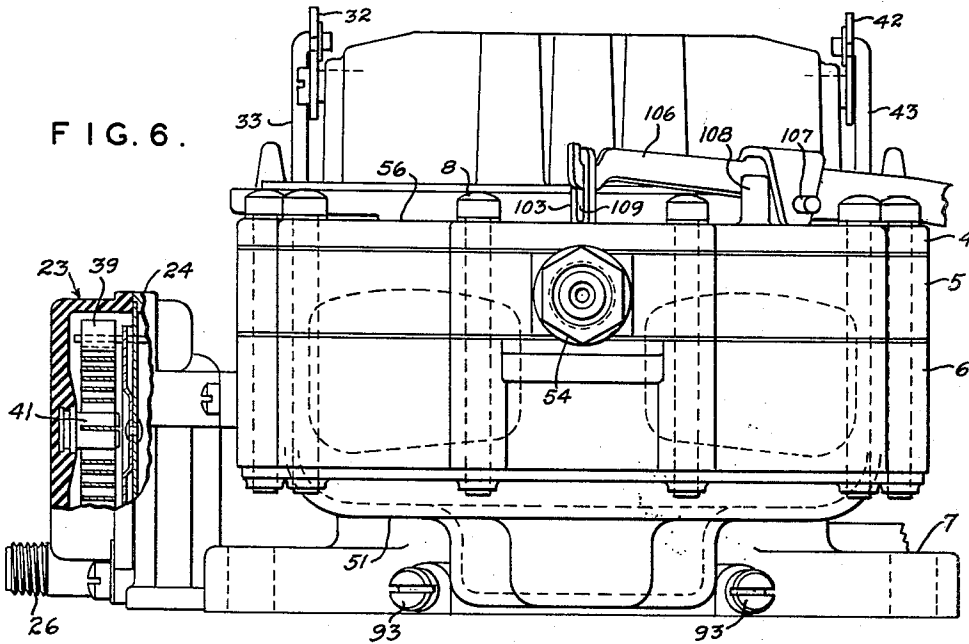


FIG. 6.

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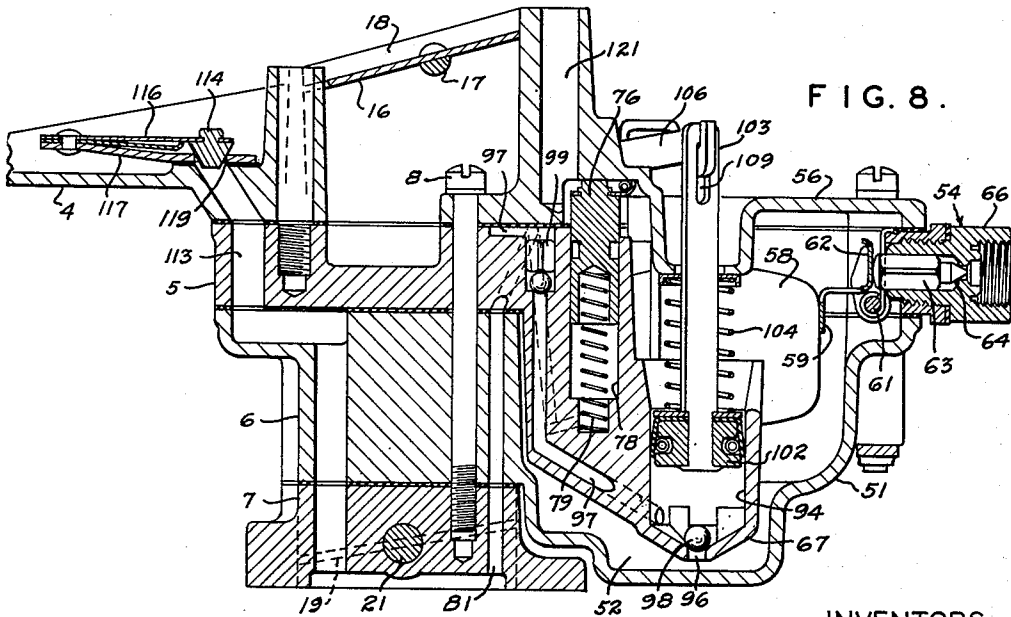
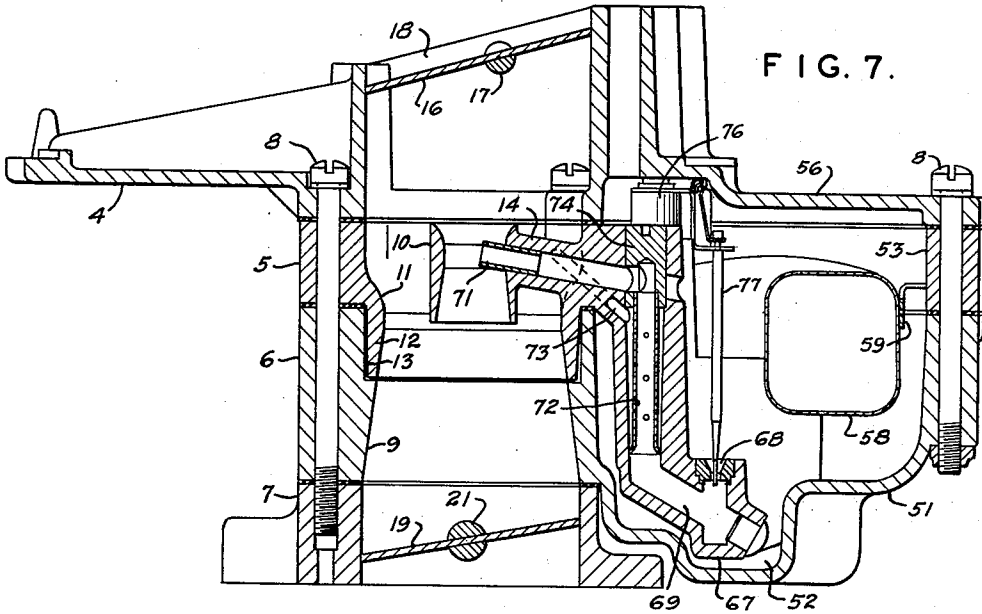
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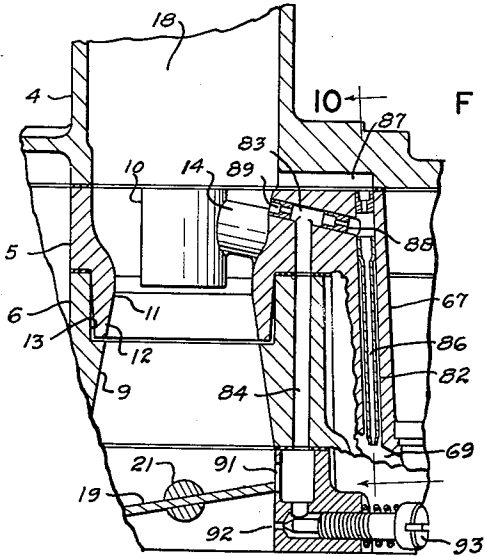


FIG. 9.

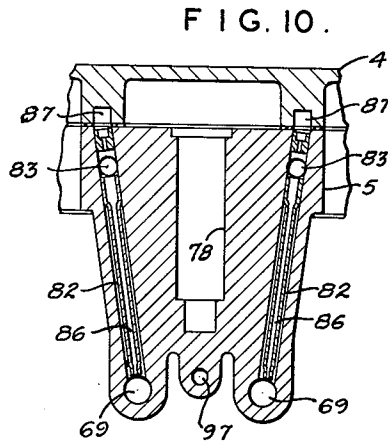


FIG. 10.

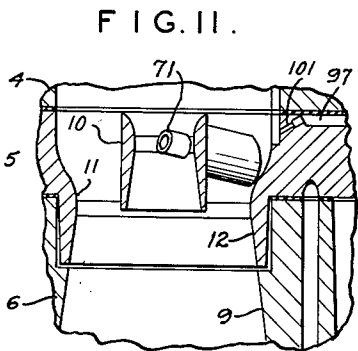


FIG. 11.

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CARBURETOR

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Filed May 2, 1960, Ser. No. 26,152

10 Claims. (Cl. 261—23)

This invention relates to carburetors, and has for an object the provision of a carburetor structure which is relatively inexpensive to manufacture and more efficient and reliable in use.

Another object of the invention resides in the provision of a carburetor comprising a plurality of individual sections secured together by mechanical fasteners, such as bolts or screws, to facilitate manufacture and assembly.

A further object of the invention resides in the provision of a carburetor comprising an air horn section, a main body section, a fuel bowl section, and a throttle section, the several sections being secured together in stacked relationship to form a mixture conduit having main and primary venturis therein.

Another object of the invention resides in the provision of a multi-section carburetor in which a main fuel system, a step-up device, and an accelerator pump are located in a depending portion of the main body section, said depending portion being disposed within the fuel bowl and adapted to be immersed within the fuel contained therein.

Another object of the invention resides in the provision of main and primary venturis provided on a main body section formed of metal having a relatively high coefficient of heat conductivity, whereby the refrigerating effect due to expansion of fuel and air passing through the venturis acts to draw heat from the fuel in the fuel bowl and from the depending portion of the main body section, to thereby reduce the formation of vapor bubbles in the fuel bowl, accelerating pump, vacuumeter and main fuel passage.

Another object of the invention resides in the provision of a multi-section carburetor structure in which the fuel bowl section is formed of material having a relatively low coefficient of heat conductivity, such as a thermoplastic or thermosetting plastic, to reduce the passage of heat from the engine to the fuel contained within the fuel bowl.

Another object of the invention resides in the provision of a multi-section dual (two-barrel) carburetor structure which is symmetrical about a vertical plane extending longitudinally centrally of the structure.

Another object of the invention resides in the provision of a dual carburetor structure comprising two individual main fuel systems to supply fuel to their respective mixture conduits under control of a common fuel metering step-up device responsive to manifold vacuum.

Another object of the invention resides in the provision of a dual carburetor structure embodying an accelerating pump operable responsive to throttle movement to supply additional fuel to the mixture conduits, the pump having a fuel inlet disposed at the lower end of the depending portion of the main body section adjacent the bottom of the fuel bowl.

Another object of the invention resides in the provision of a dual carburetor structure provided with an idle air by-pass to supply additional air to the mixture conduit posterior to the throttle valve during idling operation of an engine at high ambient temperatures, the flow of air through said by-pass being controlled by a temperature responsive valve.

The invention embodies other novel features, details of construction and arrangement of parts which are here-

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inafter set forth in the specification and claims and illustrated in the accompanying drawings, forming part thereof, wherein:

FIG. 1 is a side elevation showing an internal combustion engine provided with a carburetor embodying features of the invention.

FIG. 2 is a top plan view of the carburetor.

FIG. 3 is a top plan view of the carburetor with the air horn section removed.

FIG. 4 is an elevation showing one side of the carburetor.

FIG. 5 is an elevation showing the opposite side of the carburetor, parts being broken away to illustrate the automatic choke mechanism.

FIG. 6 is an end elevation of the carburetor.

FIGS. 7 and 8 are sectional views taken along the lines 7—7 and 8—8, respectively, of FIG. 2.

FIG. 9 is a fragmentary section illustrating one of the idle fuel systems.

FIG. 10 is a fragmentary section taken along the line 10—10 of FIG. 9.

FIG. 11 is a fragmentary section illustrating the outlet passage from the accelerating pump cylinder.

Referring now to the drawings for a better understanding of the invention, the carburetor C is shown in FIG. 1 as mounted upon the intake manifold 2 of an internal combustion engine E. During operation of the engine, a conventional fuel pump P acts to move fuel from a fuel tank T through a conduit 3 to the carburetor.

The dual carburetor is shown as comprising an air horn section 4, a main body section 5, a fuel bowl section 6, and a throttle section 7, the several sections being secured together in stacked relationship by means of screws 8 to form two identical downdraft mixture conduits 9—9 having identical primary venturis 10—10 and main venturis 11—11 therein. The main body section 5 is formed with two identical annular depending flanges 12—12 telescopically engaged within annular recesses 13—13 formed in the fuel bowl section 6 to define the main venturis 11—11. The primary venturis 10—10 are supported on struts 14—14 integral with the main body section 5.

An unbalanced choke valve 16 is secured to a choke shaft 17 journaled in the air horn section 4 to control the flow of air through the air inlet 18 into the mixture conduits 9—9. A throttle valve 19 is secured to a throttle shaft 21 journaled in the throttle section 7, the valve being manually actuated by means of a suitable mechanical linkage connected to a throttle lever 22 secured to the shaft.

A conventional automatic choke control mechanism 23 for actuating the choke valve 16 is shown as comprising a choke housing 24 provided with an air inlet 26 adapted to be connected to a manifold stove by means of a conduit 27. A shaft 28 is journaled in the back wall of the housing, and levers 29 and 31 are secured to the shaft on opposite sides of the back wall. The lever 29 is connected to a lever 32 on the choke shaft 17 by means of a link 33.

A piston 34 is mounted in a cylinder 36 having a suction passage 37 leading therefrom to a mixture conduit 9, the piston being connected to the lever 31 by a link 38. A spirally wound bimetal thermostat 39 has its inner end anchored to a stud 41 and its outer end engaging the lever 31. The thermostat 39 acts to bias the choke valve toward its closed position when the engine is cold and to permit gradual opening of the valve during warm-up of the engine. The piston 34 acts to move the choke valve 16 toward its open position responsive to intake manifold vacuum.

A lever 42 is secured to the choke shaft 17 and connected by a link 43 to a cam actuating member 45 journaled on a stud shaft 44. A fast idle cam 46 is also

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journalled on the shaft 44 for engagement by an idle adjustment screw 47 mounted on the throttle lever 22. The cam 46 is unbalanced to move by gravity in a clockwise direction, as viewed in FIG. 4, and is moved in a counterclockwise direction by a lug 48 on the member 45 responsive to closing of the choke valve 16. A screw 49 is provided on the throttle section 7 for engagement with the throttle lever 22 to limit closing movement of the throttle valve 19.

The fuel bowl section 6 is formed with an elongated fuel bowl 51 having a sump 52 therein. The fuel bowl section, including the bowl 51, is formed with a flat upper surface for engagement by a flat bottom surface on the main body section 5. The main body section 5 is formed with a wall 53 which overlies and corresponds to the contour of the fuel bowl rim, said wall having a threaded aperture to receive a float actuated needle valve 54. The main body section is formed with a flat upper surface for engagement by the air horn section 4 which has a float bowl cover portion 56 engaging the top surface of the wall 53.

A float structure 57 is shown as comprising two floats 58—58 interconnected by a float arm 59 mounted for pivotal movement on a pivot pin 61 which is engaged at its ends in recesses formed in the wall 53. The float arm 59 is formed with an upwardly extending finger 62 to move a needle 63 against a valve seat 64 in the valve body 66 to control the fuel level in the bowl.

The main body section 5 is formed with a depending portion 67 which extends downwardly into the fuel bowl 51 and sump 52. The depending portion 67 is provided with two identical fuel metering orifices 68—68 leading into their respective main fuel passages or fuel wells 69—69, the passages being provided with fuel nozzles 71—71 to discharge fuel into their respective primary venturis 10—10. Apertured tubes 72—72 are provided in their respective main fuel wells 69—69 for the flow of air passing from the air inlet 18 through vent passages 73—73, the tubes being supported on plugs 74—74 press-fitted into openings in the main body section 5. The flow of fuel through the orifices 68—68 into their respective main fuel wells 69—69 is controlled by a step-up device comprising a piston 76 having two stepped metering rods 77—77 mounted thereon for vertical movement within their respective orifices to vary the fuel flow therethrough. The piston 76 is mounted in a cylinder 78 formed in the depending portion 67 and is biased upwardly toward the air horn section 4 by a compression spring 79. A suction passage 81 leads from the lower end of the cylinder 78 to a mixture conduit 9 posterior of the throttle valve 19 to cause the piston to be drawn downwardly in the cylinder responsive to a high vacuum condition posterior of the throttle valve 19 to thereby lower the metering rods 77—77 to decrease the rate of fuel flow through the metering orifices 68—68.

As illustrated in FIGS. 9 and 10, the mixture conduits 9—9 are provided with their respective idle fuel systems comprising idle fuel passages 82—82 extending upwardly from their respective main fuel passages 69—69 and merging with their respective cross passages 83—83 which, in turn, merge with downwardly extending passages 84—84. The fuel passages 82—82 are provided with fuel metering tubes 86—86 and air bleed vents 87—87 leading to the air inlet 18. The cross passages 83—83 are provided with restrictions 88—88 between the passages 82—82 and passages 84—84. Air bleeds 89—89 lead from the air inlet 18 to the upper ends of the passages 84—84. Idle ports 91—91 and 92—92 lead from the lower ends of the passages 84—84 to their respective mixture conduits 9—9, the ports 92—92 being provided with idle adjustment screws 93—93.

An accelerating pump structure is provided on the depending portion 67 between the floats 58—58, and is shown as comprising a cylinder 94 having a fuel inlet 96 and a fuel outlet passage 97 provided with inlet and

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outlet check valves 98 and 99, respectively. The fuel outlet passage 97 leads to two outlet ports 101—101 located to discharge fuel into their respective mixture conduits 9—9 adjacent the primary venturis 10—10.

A piston 102 is mounted in the cylinder 94 and provided with a piston rod 103 which extends upwardly through an opening in the cover 56. A helical compression spring 104 surrounds the rod 103 and is engaged between the cover 56 and piston 102 to bias the latter downwardly into the cylinder. A rocker arm 106 is pivotally mounted intermediate its ends on a pivot pin 107 journalled in a boss 108 on the cover 56, one end of the arm extending through a slot 109 in the piston rod 103. The other end of the rocker arm 106 is connected to the throttle lever 22 by a link 111. A throttle return tension spring 112 is secured at one end to the throttle section 7, and at its other end to the rocker arm 106 to bias the throttle valves 19 toward their closed position.

The carburetor is also provided with a hot idle compensator system which is shown as comprising an air by-pass 113 extending through the several sections 4, 5, 6 and 7 to deliver clean air from within an air filter to the mixture conduits 9—9 posterior of the throttle valves 19—19. The flow of air through the by-pass 113 is regulated by a valve 114 mounted on one end of a bimetal thermostat 116 secured at its other end to a base plate 117. The base plate 117 is secured to the air horn section 4 by screws 118, and is formed with a port 119 having a seat for engagement by the valve 114.

During hot weather and high underhood temperatures, some of the fuel in the fuel bowl vaporizes and passes upwardly through bowl vents 121 into the air filter and tends to enrich the fuel mixture supplied to the engine. To lean out the fuel mixture under such conditions, the thermostat 116 opens the valve 114 to supply additional air through the by-pass 113 to the mixture conduits 9—9 posterior to the throttle valves.

During idling operation of the engine, fuel is drawn from the fuel bowl through idle fuel passages 82—82, 83—83, and 84—84 for discharge through idle ports 91—91 and 92—92 into their respective mixture conduits 9—9 adjacent the edges of the closed throttle valves 19—19. In the event the ambient temperature is high, the bimetal thermostat 116 will open the valve 114 to admit additional air to pass through the by-pass 113 into the mixture conduits 9—9 posterior to the throttle valves 19—19 to lean out the fuel mixture supplied to the engine.

When the throttle valves are moved toward their closed position for deceleration or idling of the engine, the piston 76 is moved downwardly by the differential in pressure thereon to compress the spring 79 and to move the metering rods 77—77 into their respective metering orifices 68—68 to decrease the flow of fuel from the fuel bowl into the main fuel wells 69—69.

When the throttle valves 19—19 are moved toward their open position during acceleration of the engine, the spring 79 moves the step-up piston 76 upwardly against the air horn section 4 to raise the metering rods 77—77 and thereby increase the flow area through the metering orifices 68—68 to increase the amount of fuel supplied to the main fuel wells 69—69.

During acceleration of the engine, the throttle valve lever 22 actuates the link 111 and rocker arm 106 to release the piston rod 103 and permit the spring 104 to move the accelerator piston 102 downwardly in the cylinder 94 to discharge fuel therefrom into the outlet passage 97 and thence through the accelerator ports 101—101 into their respective mixture conduits 9—9 adjacent the primary venturis 10—10. The throttle return spring 112 acts through the rocker arm 106 and piston rod 103 to raise the piston 102 to draw fuel from the fuel bowl sump 52 through the inlet 96 into the cylinder 94 during movement of the throttle valves toward closed position.

During starting of a cold engine, the thermostat 39

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acts through the lever 29, link 33 and lever 32 to bias the choke valve 16 toward its closed position to increase the richness of the fuel mixture supplied to the engine. When the engine starts firing, the piston 34 acts through the link 33, levers 31 and 29, link 33 and lever 32 to urge the choke valve toward its open position against the resistance offered by the thermostat 39. As the engine warms up, warm air is drawn from a suitable source through the conduit 27 into the choke housing and thence past the piston 34 and through the passage 37 to the mixture conduits, posterior of the throttle valves, thereby causing the thermostat 39 to gradually open the choke valve.

An important feature of the invention resides in the utilization of the cooling effect, due to the expansion of the fuel mixture as it passes through the venturis, to cool the fuel within the fuel bowl and the several passages and cylinders to reduce volatilization and percolation. This result is accomplished by forming the fuel bowl section 6 of a material of low thermal conductivity, such as a plastic, and by forming the main body section 5 of a material of high thermal conductivity, such as aluminum. When heat is extracted from the venturi portion of the main body section, the temperature of the depending portion 67 is lowered sufficiently to maintain the fuel in the several passages and cylinders in a liquid condition substantially free of vapors or gases. To reduce icing, the throttle section 7 is formed of a metal of relatively high thermal conductivity adapted to be heated from a suitable source of heat.

By providing the several fuel systems on the main body section 5, it is possible to effect a material saving in the cost of manufacture and assembly. It will also be noted that the needle valve 54, step-up cylinder 78, and accelerator pump cylinder 94 are arranged in a common vertical plane on the longitudinal axis of the carburetor, and that the mixture conduits 9—9 and floats 58—58 are equidistantly spaced on opposite sides of said axis.

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. A carburetor comprising a body structure formed with a fuel bowl portion and two mixture conduits, an integral metallic structure including a fuel feed section for said carburetor and a different venturi section coextensive with each one of said mixture conduits, heat insulating means spacing said body structure from said integral metallic structure, and means extending within said fuel bowl for maintaining fuel therein at a predetermined level, said fuel feed section including a plurality of parts thereof spaced from and extending into said fuel bowl, each of said extending parts having a different terminal end portion positioned below said predetermined fuel level and a different fuel passage extending from said terminal end thereof through said metallic structure to each one of said venturi sections.

2. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-draft mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different primary venturi and a different main venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending through said depending portion, each one of said passages having an outlet port opening into a different one of said primary venturis and an inlet

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port opening through said depending portion into said fuel bowl below said predetermined fuel level.

3. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-draft mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening through said depending portion into said fuel bowl below said predetermined fuel level, a third of said sections comprising an air horn section, a fuel bowl cover integral with said air horn section, an air inlet portion projecting upwardly from said air horn section, a fourth of said sections comprising a throttle section engaging the lower side of said one section and including a different throttle valve mounted in each of said mixture conduits, and two idle fuel systems comprising idle fuel passages extending from their respective main fuel passages through said depending portion and said first section to idle ports adjacent to said throttle valves.

4. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-draft mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening through said depending portion into said fuel bowl below said predetermined fuel level, and an accelerating pump structure including a cylinder formed in said depending portion and having an inlet passage below said predetermined fuel level and an outlet passage extending through said depending portion to one of said venturis.

5. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-draft mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different primary venturi and a different main venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending through said depending portion, each one of said passages having an outlet port opening into a different one of said primary venturis and an inlet port opening through said depending portion into said fuel bowl below said predetermined fuel level, and a pair of metering rods movably mounted on said second section with each metering rod extending into a different one of said fuel passage inlet ports.

6. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-

draft mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening through said depending portion into said fuel bowl below said predetermined fuel level, a pair of metering rods movably mounted on said second section with each metering rod extending into a different one of said fuel passage inlet ports, a vacuum piston slidably mounted within said depending portion, and means operatively connecting said piston to said pair of metering rods.

7. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two downdraft mixture conduits, a different throttle valve movably mounted in each one of said mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending upwardly through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening into said fuel below said predetermined fuel level and a fuel well within said depending portion intermediate said ports, and means forming a different idle fuel passage extending from each one of said fuel wells and having an idle port in a different one of said mixture conduits adjacent to said throttle valve therein.

8. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two downdraft mixture conduits, a different throttle valve movably mounted in each one of said mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending upwardly through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening into said fuel below said predetermined fuel level and a fuel well within said depending portion intermediate said ports, means forming a different idle fuel passage extending from each one of said fuel wells and having an idle port in a different one of said mixture conduits adjacent to said throttle valve therein, and an accelerating pump structure including a cylinder formed in said depending portion and a piston within said cylinder, said depending portion having an inlet passage to said cylinder below said predetermined fuel level and an outlet passage extending from said cylinder through said depending portion to one of said venturis.

9. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two down-

draft mixture conduits, a different throttle valve movably mounted in each one of said mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a different venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending upwardly through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening into said fuel below said predetermined fuel level and a fuel well within said depending portion intermediate said ports, means forming a different idle fuel passage extending from each one of said fuel wells and having an idle port in a different one of said mixture conduits adjacent to said throttle valve therein, an accelerating pump structure including a cylinder formed in said depending portion and a piston within said cylinder, said depending portion having an inlet passage to said cylinder below said predetermined fuel level and an outlet passage from said cylinder extending through said depending portion to one of said venturis, and a pair of metering rods movably mounted on said second section with each metering rod extending into a different one of said fuel passage inlet ports.

10. A carburetor for an internal combustion engine and comprising a plurality of individual sections secured together in stacked relationship and providing two downdraft mixture conduits, a different throttle valve movably mounted in each one of said mixture conduits, a first one of said sections comprising a fuel bowl, means within said fuel bowl for maintaining fuel therein at a predetermined level, a second of said sections comprising an integral structure formed with a venturi in each mixture conduit and a depending portion extending downwardly within said fuel bowl below said predetermined fuel level and spaced from the walls thereof, heat insulating means spacing said first section from said second section, said second section formed with two main fuel passages extending upwardly through said depending portion, each one of said passages having an outlet port opening into a different one of said venturis and an inlet port opening into said fuel below said predetermined fuel level and a fuel well within said depending portion intermediate said ports, means forming a different idle fuel passage extending from each one of said fuel wells and having an idle port in a different one of said mixture conduits adjacent to said throttle valve therein, an accelerating pump structure including a cylinder formed in said depending portion and a piston within said cylinder, said depending portion having an inlet passage to said cylinder below said predetermined fuel level and an outlet passage from said cylinder extending through said depending portion to one of said venturis, a pair of metering rods movably mounted on said second section with each metering rod extending into a different one of said fuel passage inlet ports, a vacuum piston slidably mounted within said depending portion, and means operatively connecting said vacuum piston to said pair of metering rods.

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