

Aug. 9, 1949.

W. H. WEBER
CARBURETOR

2,478,613

Filed Oct. 6, 1944

3 Sheets-Sheet 1

FIG. 1

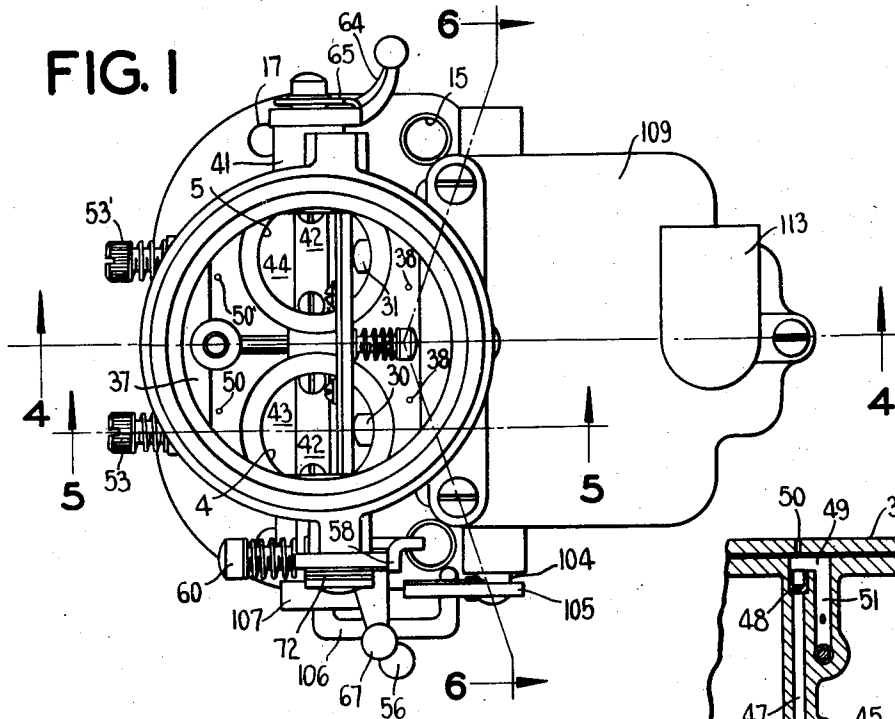


FIG. 2

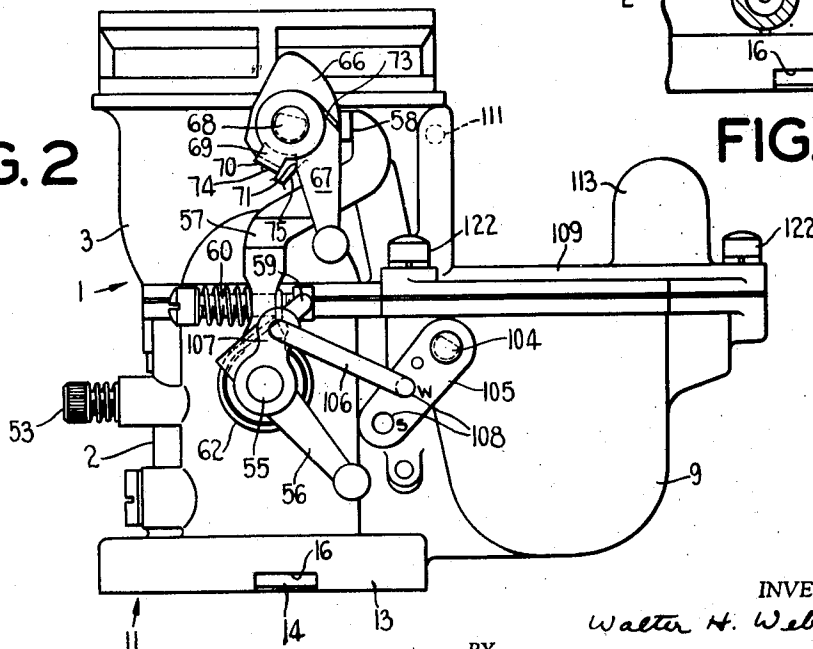
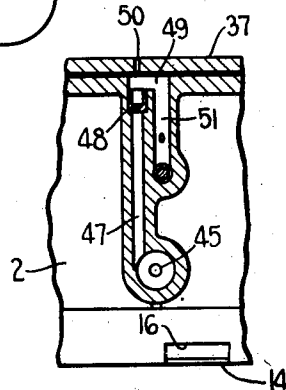


FIG. 7



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FIG. 3

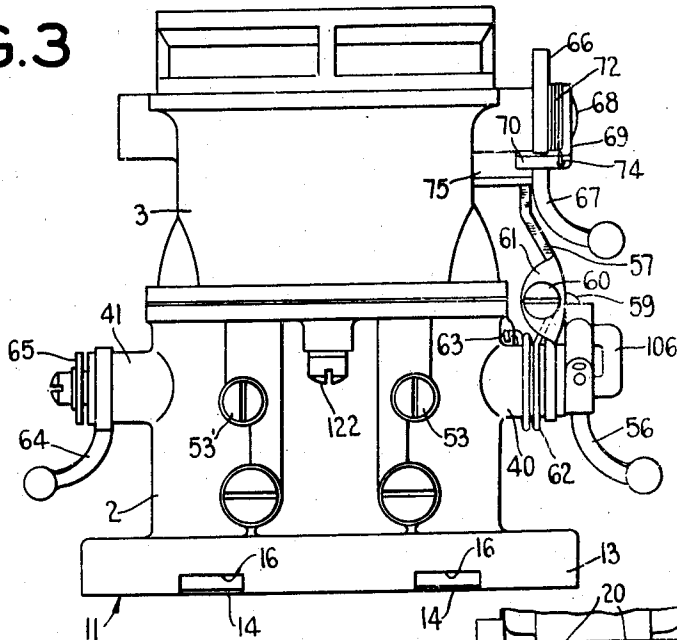


FIG. 4

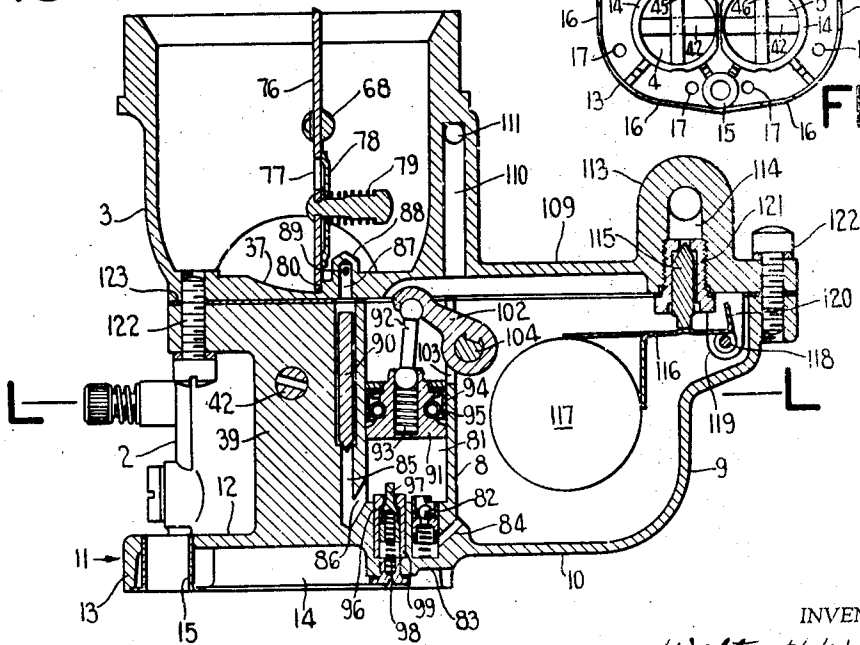
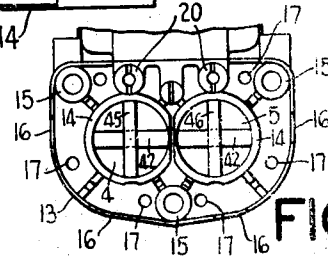


FIG. 8



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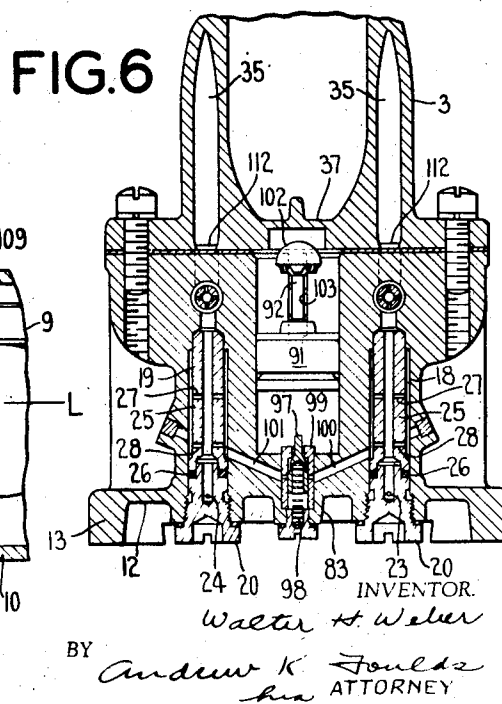
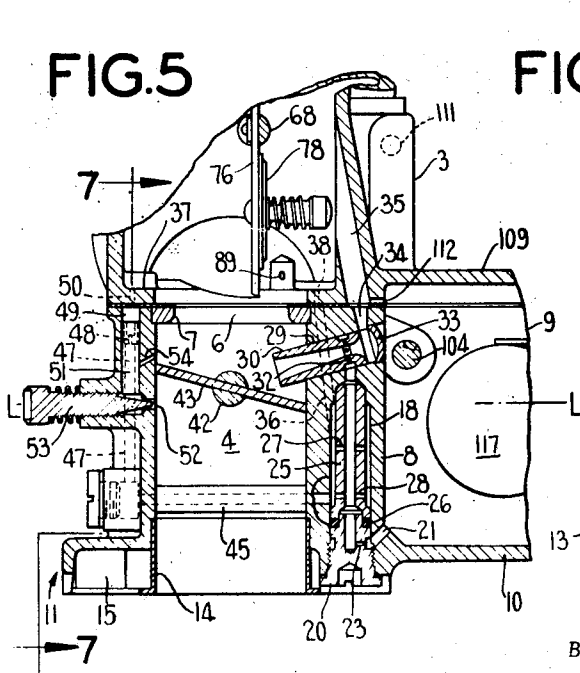
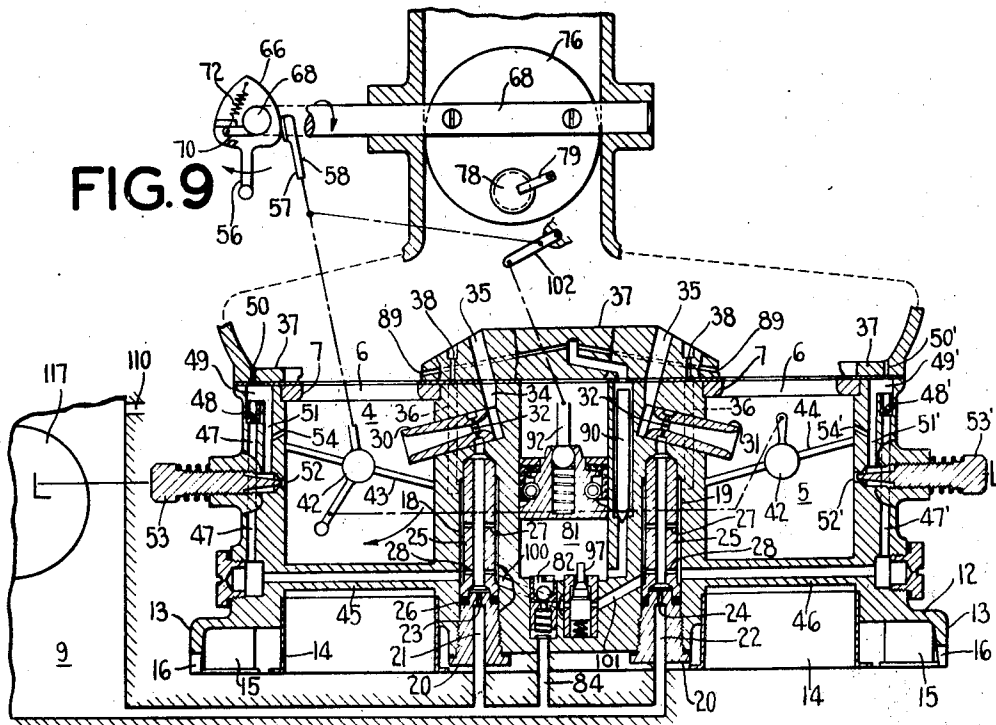
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,478,613

CARBURETOR

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Application October 6, 1944, Serial No. 557,405

7 Claims. (Cl. 261-10)

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This invention relates to new and useful improvements in carburetors for supplying combustible mixtures to internal combustion engines.

One object of the invention is to provide a carburetor of the downdraft type having its parts compactly arranged and which is of simple construction such that it is capable of rapid and easy manufacture.

Another object is to provide a carburetor having means for cooling the fuel to be supplied to the mixing chamber.

Another object is to regulate the fuel-air ratio of the combustible mixture in accordance with the demands on the engine supplied by the carburetor.

Another object is to provide means to reduce the formation of gas bubbles in the fuel conduits, thereby assuring proper fuel flow.

Another object is to provide a valve for controlling air admission to the carburetor mixing chamber and which is both manually adjustable and automatically operable by engine suction.

The invention consists in the novel construction and cooperative relation of parts to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings to be taken as a part of this specification, there is fully and clearly illustrated a preferred embodiment of the invention, in which drawings:

Figure 1 is a top plan view of a carburetor constructed in accordance with the invention;

Fig. 2 is a view of the carburetor in front elevation;

Fig. 3 is a view in elevation looking from the left of Fig. 2;

Fig. 4 is a view in vertical central section on the line 4-4 of Fig. 1;

Fig. 5 is a view of part of the carburetor in vertical section and taken on the line 5-5 of Fig. 1;

Fig. 6 is also a partial view in vertical section and taken on the line 6-6 of Fig. 1;

Fig. 7 is a detail view in vertical section on the line 7-7 of Fig. 5;

Fig. 8 is a bottom plan view of part of the carburetor, and

Fig. 9 is a diagrammatic view showing the interrelation of certain of the parts of the carburetor.

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Referring to the drawings by characters of reference, 1 designates generally the metal casing of the carburetor including a lower throttle body member 2 having an air inlet member 3 superposed thereon and secured thereto, the members preferably being die cast. The body member 2 has a pair of laterally positioned vertical cylindrical bores or passageways 4, 5 therethrough providing downdraft mixing chambers. The mixing chamber 4 has, at its upper end, an air inlet 6 in which there is positioned a throat ring 7 for restricting and accelerating air flow from the inlet member 3 into the mixing chamber 4. The ring 7 fills and is supported in a counterbore or annular recess in the upper end of the body member 2, such that the top face of the ring is flush with the top face of the body member. The bore or edge of the opening through the ring 7 is preferably of rounded downward diverging form or contour. The mixing chamber 5 is provided with a similar air inlet throat ring 7. Extending horizontally from the side of the body member 2 and separated from the mixing chambers 4, 5 by a vertical wall 8, there is a constant level fuel reservoir or float chamber 9 which is of substantially equal height with the passageways 4, 5. The bottom float chamber wall 10 lies within the height of the horizontal hollow clamping flange 11 which extends laterally from and in surrounding relation to the mixing chambers at the bottom end of the body member 2. The flange 11 has its top face formed by a horizontal web portion 12 from which a downward extending marginal rim 13 projects which is adapted to seat on and be clamped to the engine inlet manifold. Cooperating with the rim 13 there are tubular members or sleeves 14 forming the lower end portions of the passageways 4, 5 and which have their lower ends terminating in outturned flanges to seat against the manifold. These sleeves 14 are preferably of metal having a high resistance to heat transfer and are preferably of stainless steel. The bolt receiving apertures in the flange 11 are formed by stainless steel tubes 15 outwardly flanged at their bottom ends to seat on the manifold. The hollow flange 11 has air inlet openings 16 through the rim 13 and has air outlet apertures 17 in the web portion 12, see Fig. 8, so that convection air currents can circulate through the interior of the flange 11 and around the lower ends of the passageways 4, 5.

Extending upwardly into the wall 8 through downward extending bottom bosses within the flange 11 there are tubular cylindrical chambers 18, 19 which have their lower ends internally screw-threaded and which have their upper portions providing sub-atmospheric fuel wells. Screw-threaded into and closing the lower ends of the chambers 18, 19 there are main fuel jet plugs 20, each having an annular circumferential recess communicating with their respective fuel supply conduits 21, 22 of uniform unrestricted bore and inclined downward from the interior of the float chamber 9. The plugs 20 have calibrated main fuel jets or orifices 23, 24 communicating respectively with the conduits 21, 22 and opening laterally into the lower ends of fuel conduit portions opening upwardly through the upper ends of the plugs 20. This construction exposes the plugs containing the main fuel jets to the cooling action of the convection currents which circulate through the flange 11. The upper ends of the plugs 20 are provided with central tubular projections which extend, with a slip fit, into the lower ends of fuel tubes 25 which extend upward concentrically within the chambers 18, 19 to form the annular fuel wells. The upper ends of the tubes or members 25 extend and fit into cylindrical recesses in the upper end walls of the chambers 18, 19 and are sealed therein by the compressive force of the plugs 20, a sealing washer 26 being interposed between each of the plugs 20 and tubes 25 so that the lower ends of the fuel wells and also the joints between the plugs 20 and members 25 are effectively sealed. The bores of the tubes 25 provide fuel conduit portions which communicate with the fuel wells 18, 19 through upper and lower cross apertures or air vents 27, 28 respectively. The bores of the tubes 25 register with upper conduit portions in the wall 8, which conduit portions intersect downward inclined bores 29 opening into the passageways 4, 5 respectively adjacent and below the throat rings 7. Tightly fitted in the bores 29 there are fuel nozzles 30, 31 discharging and projecting respectively into the passageways 4, 5. The nozzles 30, 31 are of Venturi form and extend into the passageways 4, 5 a distance substantially equal to one quarter of the passageway diameter. Each nozzle has an external surrounding channel registering with the vertical fuel conduit leading upward from its well. Each of the nozzles also has a plurality of radial fuel orifices 32 opening from its external channel into its Venturi throat. The nozzle receiving bores 29 extend through the wall 8 and are closed at their float chamber ends by disc plugs 33. The nozzles 30, 36 terminate at their inner ends short of the plugs 33 so that the inner ends of the bores 29 provide air chambers communicating with and feeding the nozzles 30, 31. Air is supplied to these bore chambers by a pair of passageways 34 which open upward through the top face of the throttle body member 2. The passageways 34 communicate with air supply ducts 35 which extend upward in the wall of and open into the interior of the hollow air inlet member 3. Air supply passageway or ducts 36 in the wall 8 and opening upward through the top face of the body member 2 serve to feed air to the upper ends of the fuel wells 18, 19 around the tubes 25 and above the cross vents 27. The air inlet member 3 has a horizontal bottom wall 37 through which there are calibrated air bleeds 38 registering one with each of the passageways 36 and controlling the sub-atmospheric pressure over the fuel in the

wells 18, 19. The mixing chamber passageways 4, 5 are separated by a vertical wall 39, see Fig. 4, which intersects the wall 8. The body member 2 has aligned external throttle shaft bearing bosses 40, 41 which receive a throttle shaft 42 journaled in an aperture through the wall 39. Fixed on or to the shaft 42 in the passageways 4, 5 there are throttle valves 43, 44 respectively which are positioned with their leading sides closely underlying the nozzles 30, 31 respectively and such that the nozzle bores are aimed and discharge substantially at the mid portions of the valves.

Extending across the passageways 4, 5 there are bridging conduit members or tubes 45, 46 respectively which are transverse to the throttle shaft 42 and communicate with the wells 18, 19 substantially in alignment with the air vents 28. The tube 45 discharges into the lower end of a vertical fuel conduit 47 extending upward through a vertical boss on the side wall of the member 2 and substantially opposite the well 18. The upper end of the conduit 47 discharges through a calibrated orifice 48 into a mixing chamber 49 which is supplied with air through a calibrated air bleed 50 through the air inlet bottom wall 37. From the chamber 49 there is a downward extending conduit 51 diametrically opposite the discharge end of the nozzle 30 and which terminates in an idling fuel jet or port 52 opening into the chamber 4 below and spaced from the trailing edge of the valve 43. The port 52 is controlled by an adjustable needle valve 53 having its stem projecting externally from the member 2. The conduit 51 is also connected to the passageway 4 by a port 54 inclined toward the inlet 6 and opening into the passageway 4 above the closed position of the trailing edge of the throttle valve 43 so that the port 54 serves to bleed air into the idling conduit 51 for closed and slightly open positions of the throttle valve. As the throttle valve is opened, the port 54 will change over from an air bleed and will serve as a fuel port and discharge fuel from the idling conduit 51 into the passageway 4. The idling conduit formed by passageways 47 and 51 provides an inverted U-shaped passageway which permits tilting of the carburetor to an angle of about 35° without flow of fuel through the jet 48 and thence into the mixing chamber. The positioning of the jets 32 in the main nozzles 30, 31 closely adjacent to the float chamber also permits this tilting of the carburetor without flow of fuel through the nozzles into the mixing chambers. The idling fuel conduits and ports which supply the passageway 5 are identical with those which supply the passageway 4 and therefore a detail description is unnecessary, the primes of the reference characters designating like parts.

The projecting throttle shaft end 55, see Fig. 2, has fixed thereon an operating lever 56 for connection to a remote control point such as the usual accelerator pedal. Journaled on the shaft end 55 between the lever 56 and the boss 40 there is a throttle adjusting lever 57 extending upward with its free end terminating in a laterally offset cam follower portion or flange 58. The levers 56 and 57 are interconnected for movement in unison by a right angle pin 59 extending from the lever 56 and having its free end journaled in the swivelled end portion of an adjustment screw 60 which is adjustably screw threaded through parallel ears or flanges 61, of which one only is shown, and turned or bent backward from the side edges of the lever 57, see Fig. 3. This screw 60 provides for adjustment of the lever 57

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relative to the throttle plates or valves 43, 44. Surrounding the bearing boss 40 there is a coil spring 62 having one end terminating in an eyelet to receive the screw 60 and having its other end secured, as at 63, in an aperture boss on the body member 2 such that the spring urges the throttle valves toward closed position and the lever 57 from right to left facing Fig. 2. The other end of the throttle shaft which projects from the boss 41 has an operating lever 64 journaled thereon which cooperates with an arm 65 fixed on the throttle shaft such that the lever 64 limits closing movement of the throttle valves while permitting the throttle shaft to have unimpeded valve opening rotation.

The cam follower flange 58 cooperates with and is urged by the spring 62 against a cam 66 forming part of a choke lever 67 journaled on a projecting end portion of the air inlet choke valve shaft 68. The lever 67 is coupled to the shaft 68 by a lever 69 having a stop arm or finger 70 extending between spaced abutments formed by the radial side edges of an edge slot 71 in the lever 67. The lever arm 70 is urged in an air valve closing direction and against the corresponding slot end by a coil spring 72 having one end secured, as at 73, to the lever 67 and having its other end secured, as at 74, to the arm 70. The stop arm 70 is cooperable with an abutment member 75 projecting from the inlet member 3 and serves to limit movement of the shaft 68 beyond full open air valve position. Secured on the shaft 68 within the inlet member 3 and controlling air flow therethrough to the passageway inlets 6, there is a choke valve 76 of the eccentric butterfly type having a high vacuum relief valve formed by air inlet ports 77 (of which but one is shown) closed by a spring loaded valve disc 78 which is movable to open position against the force of the spring 79 upon engine operation under its own power, as is well understood in the art. The air valve 76 is limited to full open position by an abutment 80 on the inlet member wall 37.

Positioned at the intersection of the wells 8 and 39 there is a vertical cylindrical pump chamber 81 having a check valve controlled fuel inlet 82 in its bottom wall. The fuel duct forming the inlet 82 has its lower portion within a boss 83 positioned within the hollow flange 11 so that it is air cooled. This duct is fed through a downward inclined passageway or port 84 leading from the float chamber 9 so that tendency of air or gas bubbles to collect in the duct will be materially reduced. Extending vertically upward in the wall 39 between the throttle shaft 42 and the chamber 81 there is a pump discharge conduit 85 having its inlet end portion downward inclined, as at 86, from the chamber 81 and having its upper end registering with the bore 87 of a fuel nozzle 88 which extends upward from the bottom wall 37 between the passageways 4 and 5. The nozzle 88 has discharge ports 89 directed laterally or horizontally across the air inlets 6 of the passageways 4 and 5. Flow of fuel by engine suction through the pump discharge duct 85 is prevented by a check valve 90 which is of elongated pencil form to reduce the flow area of the passageway 85, thereby cutting down the quantity of fuel which will trap above or on the outlet side of the valve seat. Within the chamber 81 there is a piston or plunger 91 having a piston rod 92 universally supported therein and abutting a compression spring 93 which, on the piston discharge stroke, is compressed by the rod 92 so as

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to provide lost motion and a follow up fuel discharge after the discharge movement of the rod 92 is stopped. The piston 91 is provided with packing 94, preferably of leather, which is expanded outward against the wall of the chamber 81 by an annular resilient ring 95, preferably a helical coil spring of circular form and held in a circumferential recess in the piston 91.

In the bottom wall of the pump chamber 81 there is a power jet 96 controlled by a valve member 97 having a stem projecting through the jet port and upward into the chamber 81 for engagement by the bottom wall of the piston 91 when the piston has moved substantially to the end of its discharge stroke. The valve 97 is urged to closed position by a helical coil spring 98 which is positioned in a recess formed in the body boss 83. The valve 97 is reciprocal in a cylindrical cage 99 having outlet ports aligned with fuel ducts 100, 101 leading at an upward inclination to the wells 18, 19 respectively. The ducts 100, 101 open into the wells 18, 19 substantially at the bottom ends thereof. The stem of valve 97 projects upward into the chamber 81 sufficiently so that the lower end of the valve will be limited by the wall of its recess before the piston 91 engages the top end of the valve cage 99 such as would close the power jet. The rod 92 is connected at its upper free end by a universal snap ball joint to the end of a lever 102 extending through a slot 103 in the wall 8 between the chamber 81 and the float chamber 9. The lever 102 is rigidly fixed to a shaft 104 which extends horizontally through the float chamber 9 parallel with the throttle shaft 42 and has its ends journaled in the float chamber walls. One end of the shaft 104 projects externally of the float chamber adjacent the throttle shaft end 55 and has secured on its external end an operating lever 105 which is connected by a link 106 to an arm 107 of the throttle operating lever 56. The lever 105 may be provided with link receiving apertures 108 to receive the end of the link 106 at different radial distances from the shaft 104 in order to regulate the length of the stroke of the piston 91 to provide different pump discharge for summer or winter operation for the same extent of throttle movement.

The inlet member 3 carries and has formed integral therewith the float chamber cover 109 which is recessed on its underside to provide reinforcing ribs and a clearance space for the free end of the pump operating lever 102, see Fig. 4. The float chamber is vented to atmosphere from above the fuel level indicated by the line L—L by a passageway 110 extending upward in the side wall of the member 3 and opening externally of the inlet member 3 through a horizontal port 111. Each of the air inlet passageways 35 to the nozzles 30, 31 is connected to the float chamber above the liquid level therein by a port 112, see Figs. 5 and 6, so that any gas forming over the fuel in the float chamber will be drawn into the mixing chambers 4 and 5. The float chamber cover 109 is provided with an inlet fitting 113 for connection by a conduit (not shown) to the source of fuel. The bore or passageway 114 through the fitting 113 is provided with a vertically reciprocal upward seating inlet valve 115 which is operated by a float arm 116 carrying a float member 117 which maintains the level L—L. The arm or lever 116 is pivotally supported on a shaft 118 carried by lugs 119 extending downward from the cover 109. The arm 116 has an end portion 120 engageable with the

valve seat member 121 to limit the opening movement of the valve member 115, thereby preventing disassembly of the parts and holding the inlet valve and its float together as a unit when the inlet member 3 and cover 109 are removed from the throttle body member 2. The members 2 and 3 are removably secured together by screws 122 which serve also to clamp a sealing gasket 123 between the members. The material of the gasket 123 and of the washers 26 and of the other gaskets and washers employed in the carburetor are preferably of synthetic rubber, such as Ameripol, so as to be unaffected by temperature or weather conditions.

The operation of this carburetor after its connection to the engine inlet manifold by bolting of the flange 11 thereto, is as follows: When the float chamber inlet fitting 113 has been connected to the source of fuel supply fuel will fill the float chamber 9 to the level line L—L and will also fill the wells 18, 19, the pump chamber 81, and the idling conduits 47, 47' to this constant level line. On starting the engine, the choke valve in cold weather will, of course, have been moved to closed position by clockwise movement of the choke valve lever 67, the lever movement being sufficient to take up the lost motion of the stop arm 70 in the slot 71 so that the choke valve 76 will be locked in closed position. This closing movement of the choke valve will cause the cam 66 to force its follower flange 58 toward the right of Fig. 2, thereby rotating the lever 57 in a clockwise direction so as to move the throttle valves 43, 44 toward open position sufficiently to maintain low speed operation of a cold engine. If the engine is now cranked, the sub-atmospheric pressure created in the passageways 4 and 5 will draw fuel through the idling passageway jets 48, 48' for downflow through the passageways or conduits 51, 51' and discharge of the fuel through the metered outlets 52, 52' into the passageways 4, 5 respectively. The fuel thus supplied to the passageways 4, 5 will be mixed with a minimum of air since the choke valve 76 is closed, thereby cutting off the admission of air to the idle passageway bleeds 50, 50' and 54, 54' and to the primary air ducts 35 feeding the main nozzles 30, 31. The air inlet passageway 110 to the float chamber remains open to atmosphere and therefore a minimum of air will be supplied to the primary air ducts 35 through the ports 112. Some fuel will also be drawn through the main nozzles 30, 31 thereby providing a rich fuel mixture for engine starting. As soon as the engine fires, the increased suction will open the auxiliary air inlet valve disc 78 to provide the necessary air to maintain cold engine operation. As the engine warms up, the operator will return the choke valve lever 67 counterclockwise, thereby permitting the spring 72 to come into play to permit automatic response of the air valve 76 to engine suction. When the engine has become thoroughly warmed up, the air inlet choke valve 76 will be returned to its full open position which will permit the throttle valves to be moved to their full closed position, as shown, under the force of the spring 62. The necessary fuel mixture for engine idling operation will now be supplied through the metered ports 52, 52', the fuel being controlled at the jets 48, 48' and the necessary air being admitted through the bleeds 50, 50' and 54, 54'. As the throttle valves 43, 44 are moved toward open position, the quantity of air entering the bleeds 54, 54' will decrease, thereby providing a richer mixture from the ports

52, 52', in order to provide the desired mixture in the mixing chambers 4, 5 due to the increased air passing the throttle valves. At a further open position of the throttle valves, the flow through the bleeds 54, 54' will reverse and fuel will be discharged through these bleeds from the idle conduits 51, 51' into the passageways 4 and 5 respectively. Continued opening of the throttle valves will increase the depression in the fuel nozzles 30, 31 until fuel is drawn through the nozzle jets 32 for mixture in the nozzles with air supplied through the primary air ducts 34, 35, this nozzle mixture being discharged into the mixing chambers 4 and 5. This rich fuel mixture from the main nozzles will impinge against the mid portions of the throttle valves 43, 44 and be broken up thereby for blending with the air entering through the inlets 6. The fuel supply to the nozzles 30, 31 is compensated by the air vents 27, 28 such that when the throttle valves have been opened sufficiently to create a suction which will lift fuel from the level of the passageways 27, the air admitted by the bleeds 38 will pass through the wells 18, 19 and passageways 27 to form an emulsion of air and fuel which will be fed to the fuel nozzles. Still further opening movement of the throttle valves for ordinary road loads on the engine will increase the depression in the passageways 4 and 5 to an extent which will cause the fuel wells 18 and 19 to be emptied of fuel, the air from the bleeds 38 thereupon entering the lower cross passageways or air vents 28, thus further compensating for the increased suction on the main fuel jets 23, 24. If the throttle valves are moved to substantially wide open position, then the piston 91 will engage the power jet controlling valve 97 and move it to open position so that additional fuel will be drawn from the float chamber through the pump chamber inlet check valve 82, the pump chamber 81, and the open valve 97 for discharge through the passageways 100, 101 into the wells 18, 19 respectively for supplementing the fuel supplied through the main jets 23, 24. This supplemental fuel supplied through the ducts 100, 101 will flow into the main fuel conduit through the lower air vents 28. The valve 90 in the pump discharge conduit 86 prevents any downward air flow through the conduit 86 when the power jet valve 97 is open and also prevents fuel from by-passing the power jet and flowing by suction to the pump discharge nozzle 88 as might occur with the choke valve in closed position. When the throttle valves are quickly moved to open position for engine acceleration from part throttle operation or from a position for engine idling speed, then the piston 91 will be forced downward by the rod 92, thereby expelling fuel through the discharge duct 85 sufficiently to open the valve 90 and discharge the pump chamber fuel through the nozzle jets 89 into the air inlets 6 to supply the necessary enriched mixture in the passageways 4 and 5 for rapid engine acceleration. This supplemental fuel from the pump discharge will be continued after stoppage of throttle opening movement by reason of the expansive force of the spring 93 which was compressed by the quick downward movement of the piston rod 92, thereby giving a desirable protracted discharge of accelerating fuel. Of course, if the throttle valves are moved on the accelerating operation to a wide open position, then the piston 91 will open the power jet valve 97 for discharge of a supplemental fuel supply, as above described, in addition to the pump discharge.

What is claimed and is desired to be secured by Letters Patent of the United States is:

1. In a carburetor, a casing having a passageway therethrough, an unbalanced choke valve in said passageway and having an operating shaft extending from said casing, a disc rigid on the end of said shaft external of said casing, an arm projecting from said disc toward said casing, a valve operating lever interposed between said disc and said casing and journaled on said shaft, a coil spring interposed between said disc and said lever and interconnecting said arm and said lever and acting to move said valve in a closing direction relative to said lever, said lever having a slot receiving said arm and providing an abutment on said lever and engageable by said arm to limit closing rotation of said valve relative to said lever by said spring, said slot providing a second abutment on said lever engageable by said arm and determining the extent of valve opening movement by air pressure against the force of said spring, said second abutment being operable through said arm to hold said valve closed against air pressure.

2. In a downdraft carburetor, a casing having a mixing passage with an air inlet, a throttle valve in said passage, a fuel conduit having an outlet discharging into said passage on the inlet side of said valve, said conduit having a portion of its length bridging said passage on the outlet side of said valve so that said conduit portion is positioned across the path of the discharging and expanding fuel mixture to be cooled thereby.

3. In a downdraft carburetor, a casing having a mixing passage with an air inlet, a throttle valve in said passage, a fuel nozzle discharging into said passage anterior to said throttle valve, a fuel well extending upward at one side of said passage and discharging into said nozzle, an idling conduit extending upward at the other side of said passage, a fuel reservoir feeding said well, and a fuel supply conduit connecting said well to said idling conduit below the reservoir liquid level, said supply conduit extending across said mixing passage posterior to said throttle valve so that fuel in said supply conduit will be cooled by the expansion of the air and fuel mixture after passing said throttle valve and discharging through said passage.

4. A carburetor comprising a casing having a pair of vertical mixing chamber passageways therethrough, each passageway having an air inlet and a mixture outlet, said casing having a pump chamber and a fuel reservoir, a fuel inlet controlling float member in said reservoir, main fuel nozzles discharging one into each of said passageways, a conduit leading from said pump chamber and having a plurality of outlets one into each of said passageways on the air inlet side of said nozzles, a vertical wall separating said passageways from said reservoir, said pump chamber being in said wall and between said passageways and said reservoir, said wall having a vertical slot above the reservoir liquid level and connecting the interior of the pump chamber to said reservoir, an operating shaft in said reservoir and journaled in the side walls of said reservoir and positioned between said slot and said float member, a piston in said pump chamber, a lever rigid on said shaft and extending through said slot and interconnecting said shaft and said piston, and means to rotate said shaft.

5. In a downdraft carburetor, a throttle body member having a vertical passageway terminating at its lower end in a tubular outlet portion,

a hollow clamping flange forming around and with said outlet portion a downwardly open air flow channel, a fuel nozzle discharging downward into said passageway, a fuel reservoir integral with said body member, a hollow boss extending downward from said body member into said channel, said body member having a vertical fuel duct extending upward from said boss and connecting into said nozzle, a hollow plug positioned in said channel and sealed in said boss and having a horizontal fuel jet communicating through said plug with said duct, said body member having a fuel duct of uniform cross-section leading from said reservoir downward to said jet thereby to eliminate trapping of gas bubbles, and said flange having air flow openings for convection flow of cooling air through said channel around said boss and plug.

6. A carburetor comprising a casing having a passageway therethrough providing a mixing chamber having an air inlet, a throttle valve in said chamber, a fuel nozzle discharging into said chamber, a shaft supporting said valve and having an end portion projecting from said casing, an air pressure moveable air valve in said passageway and controlling said air inlet, a shaft supporting said air valve and having an end portion projecting from said casing, a lever journaled on said air valve shaft so that said air valve can rotate relative to said lever, said lever having a cam operable to move said throttle valve toward open position upon closing movement of said air valve, said lever having spaced abutments, an arm fixed on said air valve shaft and extending between said abutments, a spring urging said arm in a valve closing direction relative to said lever and against one of said abutments so that said air valve is moveable with said lever, the other of said abutments being spaced from and engageable by said arm to limit opening movement of said air valve by air pressure against the force of said spring, said spring having one end anchored to said arm and having its other end anchored to said air valve lever, a lever carried by said throttle valve shaft and having a follower portion engaging said cam, means interconnecting said last-named lever and said throttle shaft so that said throttle valve is opened by closing movement of said air valve, and a spring urging said follower portion against said cam and said throttle valve toward closed position.

7. In a downdraft carburetor, a casing having a mixing chamber passageway therethrough and having a fuel reservoir, a vertical wall separating said passageway and said chamber, a throttle valve in said passageway and having an operating shaft, said wall having a transverse inclined bore therethrough directed downward toward said shaft, a nozzle member in the passageway end of said bore, a plug member closing the reservoir end of said bore and spaced from said nozzle member for admission of air thereto, said wall having a vertical bore which opens from the bottom of said casing into said inclined bore, said nozzle member having a fuel port communicating with said vertical bore, said vertical bore being enlarged to provide a socket portion adjacent said inclined bore and being still further enlarged to provide a well, a tubular plug having one end fitting said socket portion and having a flange at its other end fitting the bottom portion of said well, said other plug end having a socket, a fuel jet member screw-threaded into the bottom end of said vertical bore and having a projecting portion fitting said plug socket, a gasket between

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said plug flange and said jet member, said casing having a port for fuel flow from said reservoir to said jet member, said plug having cross-ports for air flow to said nozzle member, and means to supply air to said well around said tubular plug.

WALTER H. WEBER.

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