May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

Filed Sept. 28, 1929 6 Sheets-Sheet 1

Fig. 1.

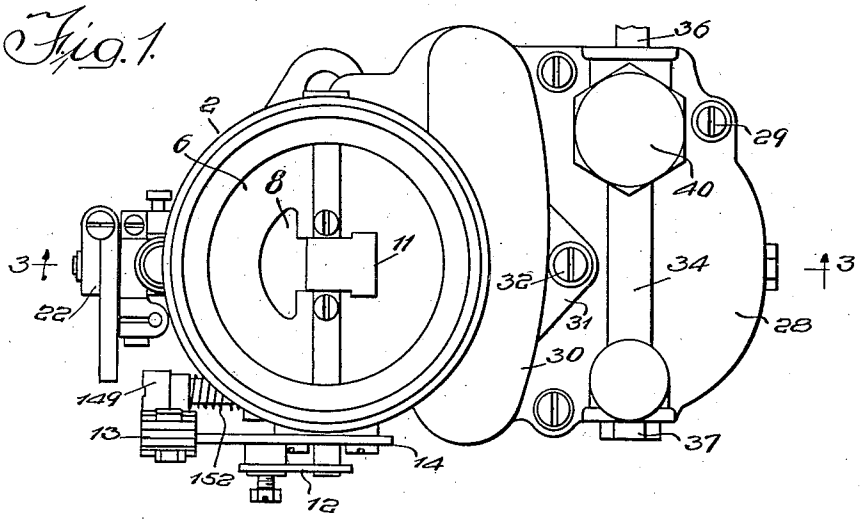
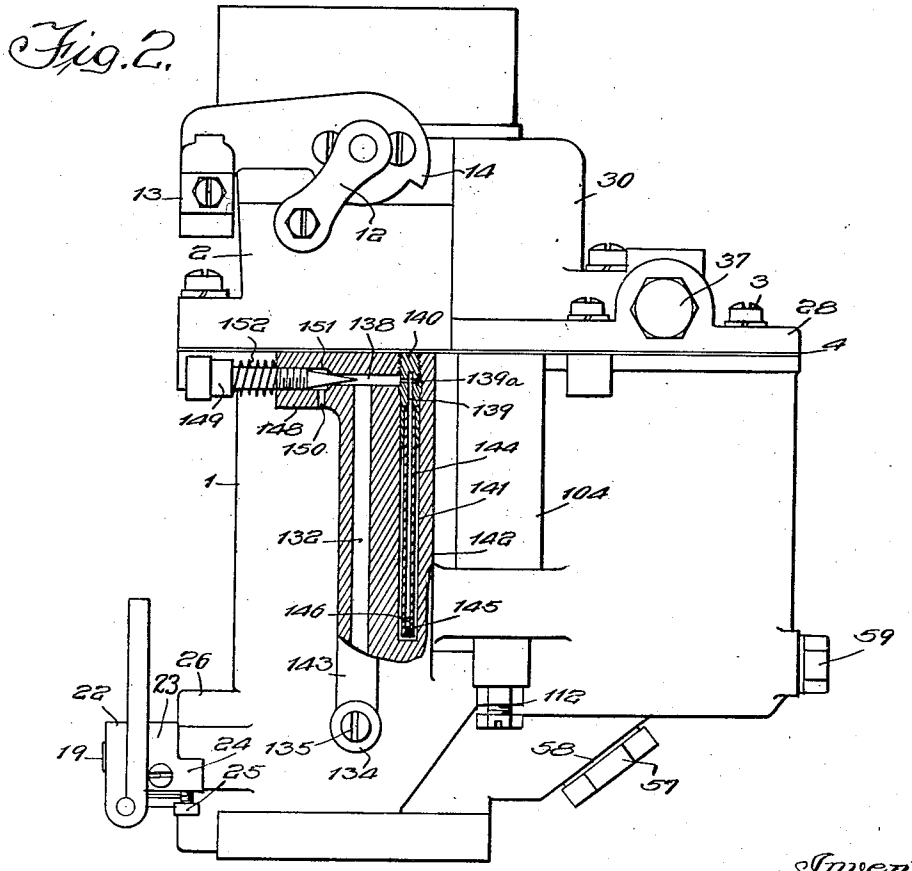


Fig. 2.



Witness:
William P. Kilroy

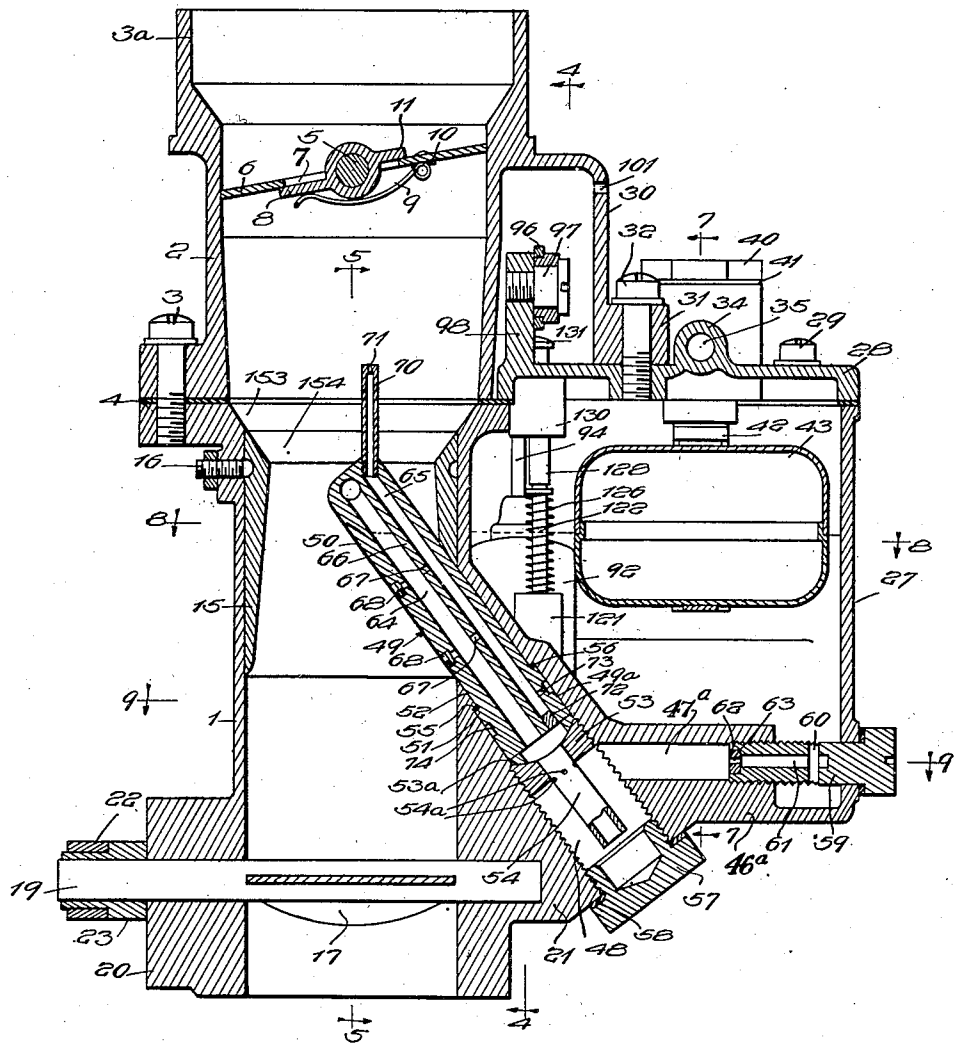
Inventors
Milton E. Chandler
Don Cote
By Brown, Jackson, Boettcher & Dienner
Attys.

May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

Filed Sept. 28, 1929 6 Sheets-Sheet 2

Fig. 3.



Witness:

William P. Kilroy

Inventors

Milton E. Chandler

Don Cole

By Brown, Jackson, Boettcher & Dienner,

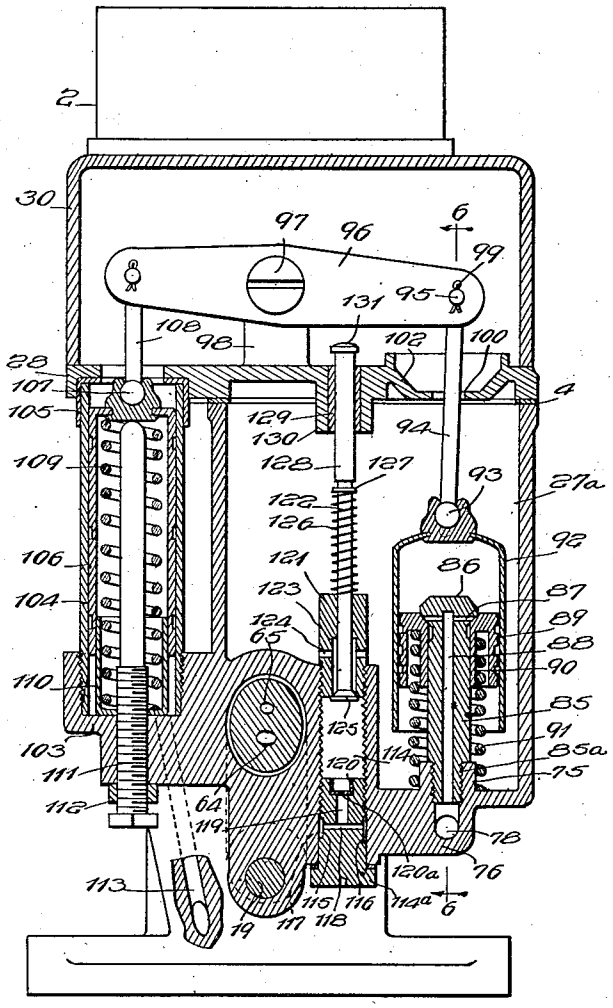
Attys

May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

Filed Sept. 28, 1929 6 Sheets-Sheet 3

Fig. 4.



Witness:
William P. Kilroy

Inventors
Milton E. Chandler
Don Cote

By Brown, Jackson, Boettcher & Dienner,
Attys

May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

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Fig. 5.

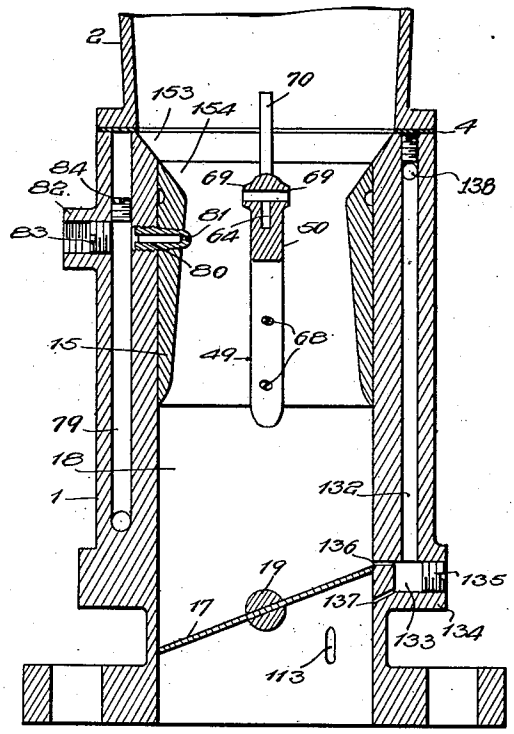


Fig. 6.

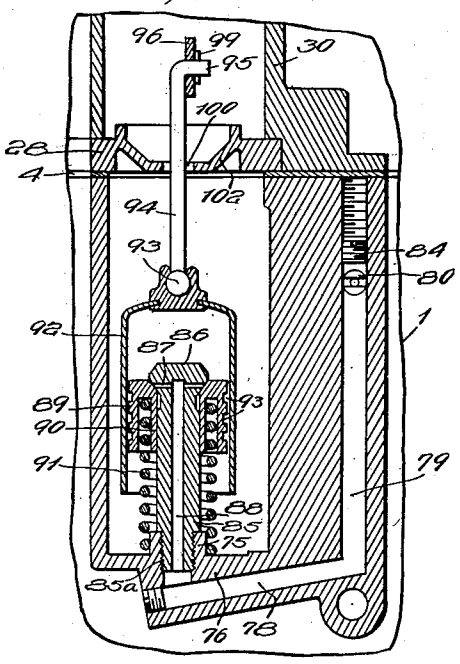
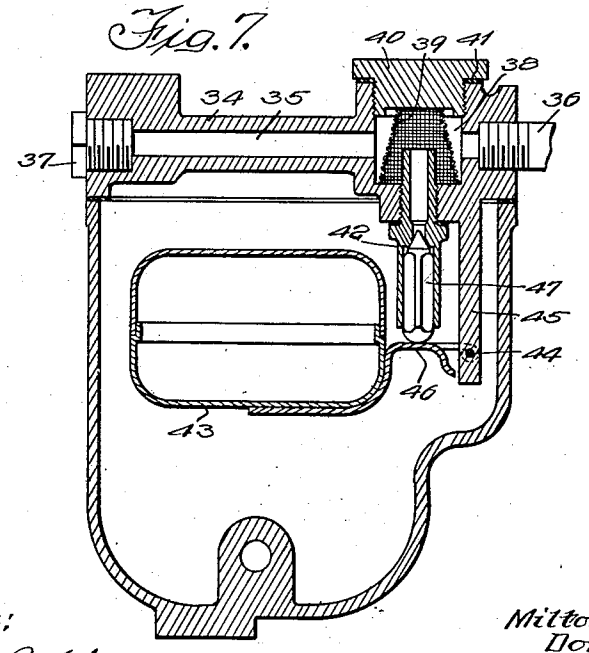


Fig. 7.



Witness:
William P. Kilroy

Inventors
Milton E. Chandler
Don Cole
By Brown, Jackson, Boettcher & Dimmer.
Attys

May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

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Fig. 8.

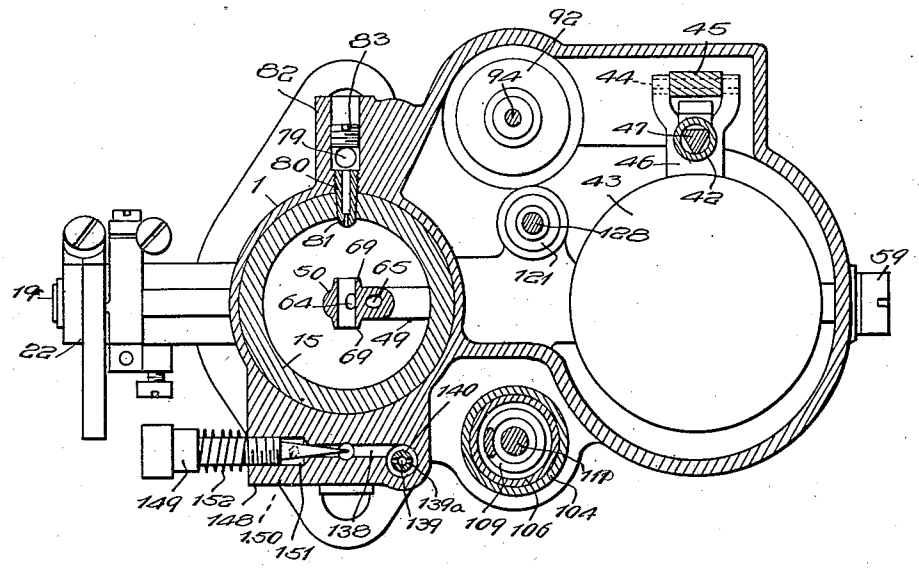
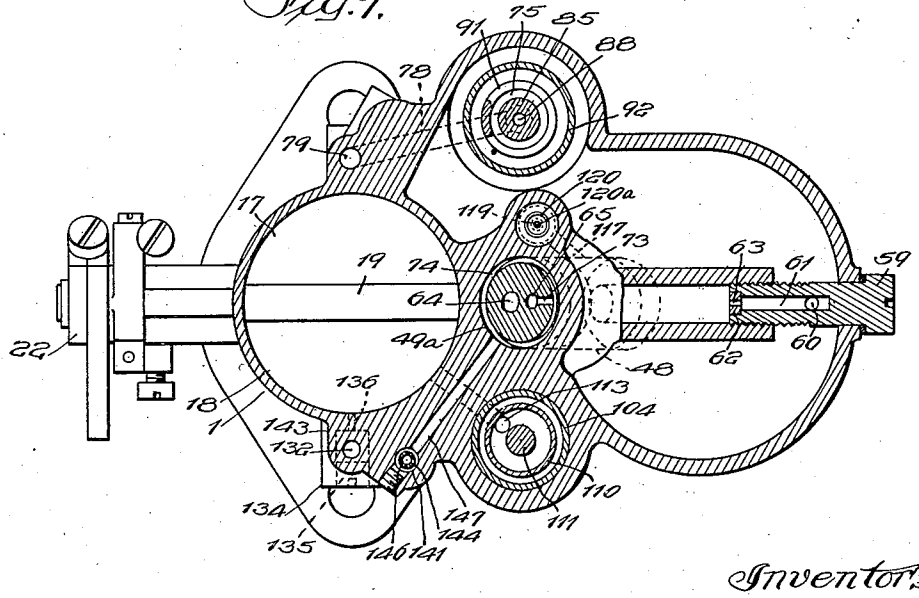


Fig. 9.



Witness:
William P. Kilroy

Inventors
Milton E. Chandler
Don Cole

By Brown, Jackson, Boettcher & Dienner,
Attys.

May 8, 1934. M. E. CHANDLER ET AL 1,957,631

CARBURETOR

Filed Sept. 28, 1929 6 Sheets-Sheet 6

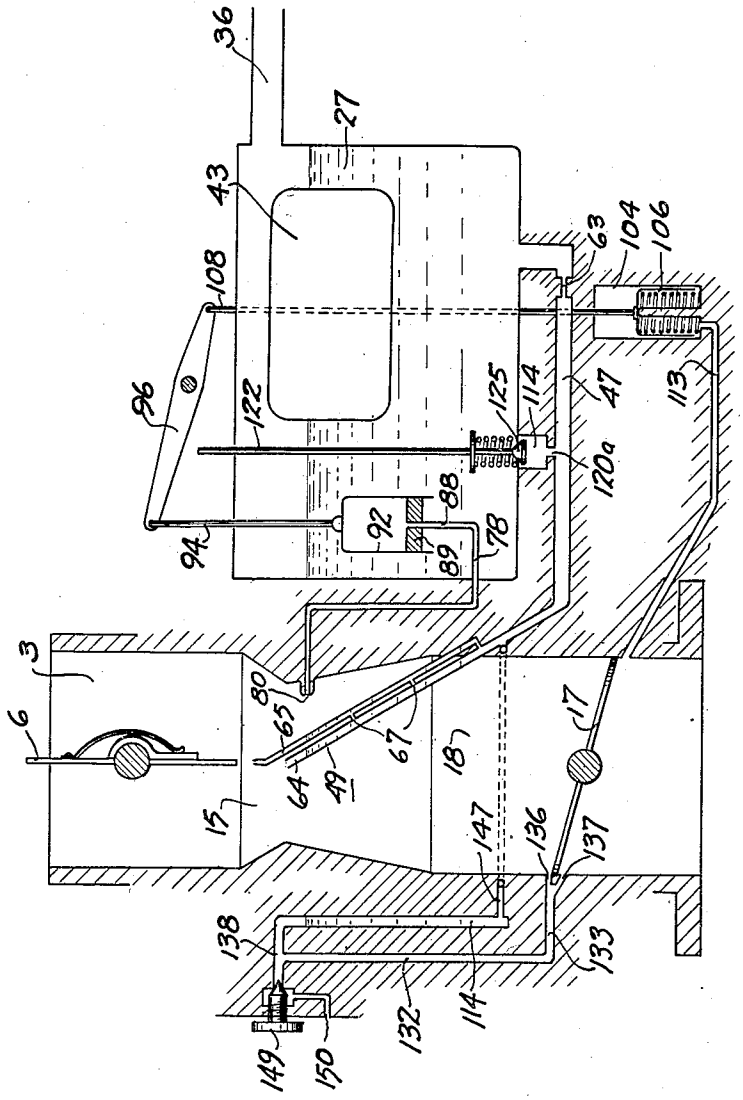


Fig. 10

INVENTORS.
Milton E. Chandler
Don Cole.

BY

M. E. McConkey
ATTORNEY

Patented May 8, 1934 1,957,631

UNITED STATES PATENT OFFICE

1,957,631

CARBURETOR

Milton E. Chandler, La Grange, and Don Cole, Chicago, Ill., assignors, by direct and mesne assignments, of one-half to Bendix Stromberg Carburetor Company, Chicago, Ill., a corporation of Illinois, and one-half to Don Cole, Chicago, Ill.

Application September 28, 1929, Serial No. 395,801

15 Claims. (Cl. 261—34)

This invention relates to carburetors, and more particularly to a carburetor of what is known as the down draft type.

In inverted or down draft carburetors, there is a tendency, due to eddy currents, to gather or draw the fuel ejected from the nozzle back to the jet body, thus causing the fuel to trickle down the nozzle instead of being ejected into the air stream in a spray. This is highly objectionable, and it is one of the main objects of our invention to provide a down draft carburetor in which the fuel is ejected from the nozzle in a spray into the air stream and in such manner as to eliminate tendency of the air current to draw this fuel back to the nozzle body.

A further object is to provide a carburetor of the down draft type in which the fuel and the air bleeds are at the tip of the nozzle and in the center of the air passage so as to assure ready discharge of the fuel from the nozzle without lag when the throttle is opened. Another object of our invention is to provide improved means for injecting a supplemental supply of fuel into the air stream when accelerating, and means in conjunction with the accelerating means for providing an increased supply of fuel to the main jet, relative to the normal supply, when operating an open throttle.

Further objects and advantages of our invention will appear from the detailed description.

In the drawings:—

Fig. 1 is a plan view of a carburetor in accordance with our invention;

Fig. 2 is a front view of the carburetor, partly broken away and in section;

Fig. 3 is a section taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a section taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a section taken substantially on line 5—5 of Fig. 3;

Fig. 6 is a section taken substantially on line 6—6 of Fig. 4;

Fig. 7 is a section taken substantially on line 7—7 of Fig. 3;

Fig. 8 is a section taken substantially on line 8—8 of Fig. 3;

Fig. 9 is a section taken substantially on line 9—9 of Fig. 3; and

Fig. 10 is a diagrammatic cross-section of the carburetor.

The carburetor comprises a lower body section 1 and an upper section 2 suitably secured to the body section, as by cap screws 3, a gasket 4 being interposed between these two sections. The upper section 2 includes an air horn 3 and has rockably mounted therein a valve rod 5 upon which is secured a choke valve 6 of known type. This choke valve is provided with an arcuate opening 7 normally closed by a plate 8, which is mounted upon rod 5 for independent rocking movement and is urged in closing direction by a wire spring 9 suitably secured at 10 to valve 6. Plate 8 is provided, at the opposite face of valve 6, with an extension 11 which coacts with the plate to provide a substantially airtight closure of opening 7 when plate 8 is in its normal closed position.

Rod 5 projects beyond section 2 and has secured on one end thereof an arm 12 adapted for reception of an operating wire which may pass through a guide, not shown, secured in a clamp 13 carried by an arm 14 secured to section 2. The valve 6 is operated in a manner well understood in the art, and the plate 8 acts, under certain conditions, to admit air through opening 7 when a predetermined value of partial vacuum is produced in the space beneath valve 6.

A venturi 15 is suitably secured in body section 1, adjacent the upper end thereof, as by means of a set screw 16. This venturi flares downwardly, as in Fig. 3, and a throttle valve 17 is mounted in section 2 adjacent the lower end thereof, the space between this throttle valve and the lower end of the venturi constituting a mixing chamber 18. The throttle valve is mounted upon a valve rod 19 rockably supported in bosses 20 and 21 of section 2, this rod extending beyond the outer face of boss 20 and having an operating arm 22 suitably clamped thereon. This arm also serves to clamp a collar 23 to rod 19, this collar being provided with two oppositely disposed fingers 24, which carry stop screws 25 disposed to contact with projections 26 of boss 20 for limiting turning movement of rod 19 in both directions. A wire or equivalent means is connected to arm 22 for operating the throttle valve in a known manner.

A float chamber 27 is associated with body section 1 of the carburetor, and is conveniently formed integrally therewith. A cover plate 28 is secured over the float chamber 27 in a suitable manner, as by means of cap screws 29. This cover plate extends beneath a wall 30 conveniently formed integrally with the upper section 2 and constituting, with the adjacent portion thereof, a housing. This wall is provided, at its central lower portion, with an integral boss 31 through which passes a cap screw 32 which

threads into a boss 33 formed integrally with cover 28 at the under face thereof.

The gasket 4 extends between the float chamber 27 and the cover 28 thereof so as to effect a fluid tight closure therebetween.

Cover 28 is provided, on its upper face, with a transversely extending rib 34 which is bored out from end to end to provide a connecting channel 35 for supplying fuel to the chamber 27. A fuel supply line may be connected to either end of this channel, the other end being closed in a suitable manner. Referring to Fig. 7, a fuel supply line 36 is suitably connected to one end of channel 35 and the other end of this channel is closed by a screw plug 37. The cover 28 is provided, adjacent one side thereof, with a chamber 38 into which channel 35 opens. A strainer, in the form of a screen of fine mesh, designated 39, is mounted in the chamber 38 and is confined between the bottom thereof and a screw plug 40, which threads into the top of the chamber, a gasket 41 being interposed between a flange on this plug and the upper end of the wall of the chamber. The strainer 39 extends about a valve seat member 42 screwing into the bottom wall of chamber 38 and projecting upwardly into the chamber. This provides a space within the chamber for sediment to collect therein about the upper extension of the member 42, thus preventing this sediment from passing into the float chamber. A float 43 is pivoted at 44 on a finger 45 extending downwardly from cover 28. Arm 46 of this float contacts the lower end of a valve 47 operating in member 42.

The float and the valve act to maintain the fuel in chamber 27 at a substantially constant level, the fuel level being indicated by the line *x—x* of Fig. 3.

Boss 21 is extended outwardly away from section 1 into the float chamber 27 to provide a cylindrical projection 46*a*. This projection is provided with a fuel passage 47*a* which opens, at its inner end, into a well 48. This well extends through the boss 21 at an inclination upwardly and inwardly of body section 1 of the carburetor. A main fuel nozzle 49 is mounted in the upper portion of well 48, which is reduced in diameter at 49*a*. This nozzle includes a body 50 which is of flattened rectangular cross-section, and a cylindrical base 51 which fits into the reduced upper portion 49*a* of the bore which provides, at its lower portion, the well 48. The upper portion of this bore or opening, above base 51 of the nozzle, is equal in diameter to the greater width of the body of the nozzle, at 52, and the venturi 15 is provided with a slot extending from its lower end and in register with opening 52 of section 1. A ring 53, through which is suitably secured a central tube 54, screws into the well 48. This ring is provided with a spherical depression in its upper face, in which seats the similarly shaped bottom of an upper ring 53*a* which bears against the lower end of base member 51 of the nozzle. Member 51 is clamped between ring 53*a* and shoulder 55, a gasket 56 being disposed between this shoulder and base 51. This arrangement assures proper position of the nozzle and a fluid tight closure about the same. The lower end of well 48 is closed by a flanged screw plug 57, a gasket 58 being interposed between the flange of this plug and the face of boss 21.

An elongated screw plug 59 passes through the wall of float chamber 27 and screws into passage 47*a* of projection 46*a*. This plug is provided with radial openings 60 which communicate with a bore 61 extending from the inner end of the plug. A plug 62 provided with a restricted opening 63 is secured in the inner end of the screw plug 59 and controls communication between passage 47*a* and bore 61. This provides a metering restriction for controlling the supply of fuel from the float chamber to the nozzle 49 in the normal operation of the carburetor.

The nozzle 49 is provided with a fuel passage 64 which is in direct communication, at its lower end, with well 48 through opening 54 of ring 53. The nozzle is also provided with an air passage 65 disposed above and parallel to passage 64 and separated therefrom by a web element 66. Spaced openings 67 extending through this web element establish communication between passages 64 and 65. These openings are bored from the under face of the nozzle, the resulting openings through the lower wall of the nozzle being closed in a suitable manner, as by means of screw plugs 68. The nozzle is provided, at its upper end, with two laterally projecting fuel discharge elements 69 which open directly into the fuel passage 64 and extend laterally beyond the nozzle at opposite sides thereof. These elements 69 are disposed centrally of the venturi 15 and adjacent the throat or choke portion thereof.

An air bleed nipple 70 is suitably secured in the upper end of nozzle 49, as by being screwed therein, and opens directly into the upper end of air passage 65. This nipple is provided, in its upper end, with a restricted air inlet opening 71. The lower end of air passage 65 is closed in a suitable manner, as by a plug 72 and a port 73 extends from passage 65, a short distance above the lower end thereof, and opens into an annular channel 74 extending about base 51 of the nozzle. In the normal operation of the carburetor, air enters the passage 65 and flows through the openings 67 into the fuel stream, the fuel being injected into the venturi 15 through the elements 69, due to the induction or suction effect exerted by the downflowing air stream. The fuel is injected from the nozzle, at opposite sides thereof, in a spray which enters directly into the main air stream and is projected sufficiently beyond the body of the nozzle to prevent the fuel from being drawn back to the nozzle by eddy currents about the same. This eliminates possibility of the fuel trickling down the nozzle, instead of being ejected therefrom into the main air stream in a spray, such as occurs in down draft carburetors not having means for ejecting the fuel well beyond the body of the nozzle and laterally thereof.

The metering restriction 63, while ample to supply fuel to the main nozzle in the ordinary operation of the carburetor, does not provide a sufficient supply of fuel when operating at full open throttle, or for acceleration.

We provide, therefore, means for injecting a supplemental supply of fuel into the air stream when accelerating, and also provide means whereby the supply of fuel to well 48 is augmented when operating on full open throttle.

Referring first to the accelerating means, the float chamber 27 is provided, at one side thereof and adjacent body 1 of the carburetor, with an offset 27*a*. An interiorly threaded collar 75 extends upwardly from the lower wall 76 of this extension and opens into an inclined passage 78 (Fig. 6) in the bottom wall of extension 27*a*, this passage 78 opening into a vertical passage 79 in body section 1 of the carburetor. A syringe discharge nozzle 80 screws into the wall of body section 1 and extends through an opening in ven-

turi 15, the inner end of this nozzle projecting a short distance into the venturi at the upper portion thereof and being provided with a restricted discharge opening 81. This nozzle 80 is inserted through a boss 82 of body section 1, this boss being suitably bored out and closed by a screw plug 83. Passage 79 is closed above screw plug 83 by means of a screw plug 84 (Fig. 5) or in any other suitable manner.

A tubular valve stem 85 is secured in collar 75, this stem having a lower reduced and threaded portion 85a which screws into the collar. At its upper end the stem 85 is provided with a head 86, the lower portion of which is of approximately inverted frusto-conical shape. This head is provided with radially extending fuel inlet ports 87 opening into bore 88 of the stem, adjacent the upper end thereof.

A piston 89 is slidably mounted upon stem 85 by means of an inner depending neck 90. The head of this piston is provided with a central depression adapted to receive the lower portion of head 86 when the piston is raised, the piston serving at this time to close the ports 87. Piston 89 is normally held in raised position, to close the ports 87, by an expansion coil spring 91 mounted about neck 90 of the piston and confined between the head of the piston and the bottom wall 76, the lower portion of this spring being mounted about collar 75.

Cylinder 89 is a loose fit in a cylinder 92 which is mounted for relative sliding movement about the piston, the piston being provided with annular grooves 93 which serve to retard, to a certain extent, flow of fuel from the cylinder above the piston and, also, to retain particles of foreign materials which would otherwise enter the cylinder and pass therefrom into the fuel stream.

Piston 92 is closed at its upper end, being open at its lower end as illustrated, and is connected by ball and socket connections 93 to the lower end of a rod 94, the upper end of which is pivotally connected in a suitable manner, as by means of a rectangularly disposed finger 95 produced by bending the rod, to one end of a lever 96 which is pivotally mounted intermediate its ends, at 97, upon a post 98 projecting upwardly from cover 28. A cotter pin 99 is inserted through finger 95 at the opposite side of lever 96 from rod 94 to prevent casual displacement of the finger.

Rod 94 passes upwardly through an opening 100 through cover 28 and, as will be noted more clearly from Figs. 3 and 4, the lever 96 and associated parts are disposed within the housing 30. This housing is preferably provided with an air inlet opening 101 through which, and the opening 100, air may enter the float chamber above the fuel level thereof. Referring more particularly to Fig. 6, it will be noted that the cover 28 is provided with a depression 102 surrounding the opening 100 to provide, in effect, a cup which directs back into the float chamber any fuel which may tend to splash therefrom through opening 100.

Boss 21 of body section 1 is provided with an extension 103 which is suitably bored and threaded from its upper face for reception of the lower end of a cylinder 104 which screws into the socket thus provided. This cylinder is disposed outside of the float chamber and has its upper end fitting into a cap 105 which fits into a socket or recess provided in the under face of cover 28 which projects beyond the adjacent wall of the float chamber and over the cylinder 104 for this purpose. A piston 106, in the form of an elongated cylinder and open at its lower end, is slidably mounted in cylinder 104. This piston is closed at its upper end and is connected by ball and socket connection 107 to a rod 108, at the lower end thereof, the upper end of this rod being connected to the other end of lever 96 in the same manner as rod 94 (Fig. 4). The piston 106 is urged upwardly by an expansion coil spring 109 disposed within the piston and confined between the upper end thereof and a spring cup 110 in which the lower end of the spring seats, this cup seating about an adjusting screw 111 which screws upwardly through extension 103 of boss 21.

This screw is held in adjustment by a jamb nut 112 and provides adjustable means for positively limiting downward movement of piston 106.

An air passage 113 extends downwardly from the socket which receives the lower end portion of cylinder 104, and this passage opens at its lower end into body section 1 adjacent and below throttle valve 17, as shown more clearly in Fig. 5. The spring cup 110 is provided with an opening through its bottom which registers with the upper end of passage 113, as shown in Fig. 9. The interior of piston 106 is thus connected to the air passage below the throttle valve and is subject to the depression or suction at the lower face of this valve. With the throttle valve partially open, the depression below this valve will be appreciably greater than the depression above the valve and a partial vacuum will be created within the piston 106. This causes downward movement of the piston against the expansive force of spring 109, placing this spring under compression. When the piston is thus depressed or moved downwardly, cylinder 92 of the accelerating pump is moved upwardly, thus creating a partial vacuum in this cylinder above the piston 89 into which the fuel from the float chamber flows. The space within the cylinder 92 of the accelerating pump is filled with fuel and with vapors generated by evaporation of the fuel, due to the creation of the partial vacuum referred to and to heating of the fuel incident to the use of the carburetor.

When the throttle valve is suddenly opened for accelerating, the suction or depression below this valve is instantaneously reduced and the reaction of spring 109 serves to quickly raise piston 106 and, through lever 96, to depress cylinder 92. This results in pressure being exerted upon the upper face of piston 89, thus depressing this piston against the action of spring 91, so as to uncover the ports 87. As soon as these ports are uncovered, a charge of fuel under pressure is injected into passages 78 and 79 and through the syringe nozzle into the throat portion of the venturi. This assures an instantaneously available supplemental supply of fuel which is projected into the main air stream when accelerating. Though the spring 109 will tend to raise piston 106 upon reduction of the depression or suction, due to opening of the throttle valve, the resistance of spring 91 and the fuel in the upper portion of cylinder 92 of the pump will retard expansion of spring 109 to a certain extent so that the injection of fuel from the syringe nozzle 80 will continue for an appreciable time after opening of the throttle valve, that is, after movement of the throttle valve in opening direction for accelerating. This is desirable as assuring an ample supply of fuel for accelerating purposes. The further the throttle valve is moved toward full open position, the greater will be the decrease in the suction effect below this valve and, consequently, the piston 6 will have a correspondingly increased upward movement under the action of spring 109

with the result that fuel will be ejected from syringe nozzle 80 for a correspondingly longer period of time.

We thus assure that an ample supply of fuel is available for accelerating purposes under all conditions.

While the metering orifice 63 of plug 62 provides an ample supply of fuel to the nozzle 49 under ordinary operating conditions, this orifice is not sufficiently large to supply fuel to the nozzle in proper quantity for most efficient operation when operating at high speed and on full open throttle. We have, therefore, provided what we term an economizer whereby a supplemental supply of fuel is fed to the main nozzle when the throttle is in full open position, or substantially so, this supplemental supply being automatically cut off from the main nozzle when operating at medium or low speeds.

Referring more particularly to Figs. 3 and 4, we provide a well 114 in boss 21 and adjacent well 48. The lower end of well 114 is closed by a screw plug 114*a* having a restricted portion 115 which forms, with the surrounding wall of well 114, an annular channel 116. This channel communicates with well 48 by a port 117 through the wall between the two wells. Plug 114*a* is provided with a diametrical bore 118 through the restricted portion 115 and opening into the channel 116. This bore intersects an axial bore 119 in the plug, the upper portion of this bore being enlarged to receive a cup 120 having a port 120*a*. A sleeve 121 is suitably secured in the upper end of well 114, as by being screwed therein. This sleeve is provided with a bore extending axially thereof and slidably receiving, in its upper portion, a valve rod 122. The lower portion of the bore of sleeve 121 is of increased diameter to provide an annular space 123 about rod 122, and the sleeve is provided with radial ports 124 opening into this space and positioned above the upper end of well 114.

The sleeve is formed at its lower end to provide a seat for a valve 125 at the lower end of rod 122 and conveniently formed integral therewith. This valve is normally held in its raised or closed position by an expansion coil spring 126 mounted about rod 122 and confined between the upper end of sleeve 121 and a collar 127 suitably secured upon the rod adjacent the upper end thereof. A plunger 128 is slidably mounted through a bushing 129 in a boss 130 depending from cover 28 of the float chamber. This plunger is provided, at its upper end, with a rounded head 131 disposed adjacent and in alignment with one arm of lever 96, namely, the arm thereof to which cylinder 92 of the accelerating pump is connected. Head 131 is in vertical alignment with this arm of the lever so as to be depressed thereby under certain conditions. Under normal operating conditions, with the throttle valve in partly open condition, the parts are in the relative positions of Fig. 4, lever 96 being so disposed as to be out of contact with head 131 of the plunger 128. When operating on full open throttle, spring 109 moves piston 106 into its full raised position, thus rocking lever 96 into position to contact with and depress plunger 128, which, in turn, unseats the valve 125. This permits flow of a supplemental supply of fuel from the float chamber to the well 48, this supplemental supply to the nozzle being sufficient to assure proper supply of fuel for operating at open throttle. It will be noted that the cup 120, which is conveniently formed of thin sheet metal, is provided with a restricted orifice 120*a*, which is much shorter relative to its diameter than the orifice 63 of plug 62.

The coefficient of discharge of orifice 120*a* is quite different from that of orifice 63 and these two orifices, having different coefficients of discharge, cooperate to assure proper supply of fuel to the nozzle 49 when the throttle valve is in full open position, or substantially so.

An idling passage 132 is provided in body section 1 and opens, at its lower end, into a bore 133 extending from the outer end of a boss 134, the outer end of this bore being closed in a suitable manner, as by means of a screw plug 135. Upper and lower ducts 136 and 137, respectively, extend from bore 133 and open into the passage of body 1, these ducts being so disposed that the upper duct 136 is above and adjacent throttle valve 17 when this valve is in closed position, and the lower duct 137 is below the throttle valve when closed. Passage 132 is connected at its upper end, by a short cross passage 138 (Fig. 2) and ports 139*a* to an axial bore 139 extending from the lower end of a screw splug 140 which screws into the upper end of a passage 141 bored in a rib 142 of body section 1, this rib being integral with rib 143 in which passage 132 is bored. The plug 140 carries a tube 144 which extends downwardly within passage 141 to a point adjacent the lower end thereof. This tube is closed at its lower end, at 145, and is provided with a fuel admission opening 146. The lower end of passage 141 is connected by an inclined passage 147 to the annular space 74 about base 51 of the nozzle 49. Passage 138 is bored from the outer end of a boss 148 formed integrally with rib 143. A needle valve 149 screws into the outer end of this boss and controls communication between passage 138 and an air bleed opening or port 150 which opens into space 151 extending about the point portion of the valve. An expansion coil spring 152 is mounted about the body portion of the valve and confined between the head thereof and boss 148, this spring acting to hold the valve in adjustment. When operating at low speeds with the throttle valve 17 nearly closed, fuel is drawn from both of the ducts 136 and 137. When idling, with the throttle valve completely closed as in Fig. 5, air flows through duct 136 and the fuel mixture is drawn through duct 137. As the throttle valve is moved toward open position, the suction effect at the ducts 136 and 137 is decreased, while the suction effect at the main nozzle is increased, so that the supply of fuel from the idling passage and jets is decreased as the main nozzle is brought into operation, no fuel being drawn from the ducts 136 and 137 in the normal operation of the carburetor, that is, except when operating at low speed or idling.

In the operation of the idling jet, when the flow of fuel has been established through the passage 132 and associated passages to the jets or ducts 136 and 137, this flow would tend to continue, due to a siphoning action, if means were not provided to prevent this. In this connection, the valve 149 and associated port 150 not only serve to provide an air bleed for the idling passage, but also provide means for admitting air to this passage so as to prevent the siphoning action referred to after the throttle valve is moved out of closed, or substantially closed position.

Referring more particularly to Fig. 3, it will be noted that the inner surface of body section 1 of the carburetor, is beveled downwardly and inwardly at the upper end thereof, at 153, this beveled portion forming a continuation of the

upper entrance portion 154 of the venturi 15. This is advantageous as providing a long entrance to the venturi, which is desirable, while permitting the venturi itself to be of comparatively thin construction. It will also noted that the nipple 70 extends well above the Venturi entrance so as to be disposed at the pressure side thereof, so as to assure proper feed of air to the air channel 65 of nozzle 49. This nozzle, as previously stated, and as will be clear from Figs. 5 and 8 of the drawings, is of substantially flat rectangular cross-section and, as previously stated, the venturi 15 is slotted from its lower end to fit snugly about the nozzle. This is advantageous as facilitating assembly and also has the great advantage of assuring that the nozzle is accurately positioned and is securely held in proper position. This is important, as the nozzle should be held at the center of the Venturi passage.

It is particularly pointed out that the upper section 2 is separate both from the cover 28 of the float chamber and from the lower section or body 1 of the carburetor, so that, by removing screw 32 and the screws which secure section 2 to body section 1, the upper section can be removed as a unit, thus exposing the walking beam or lever 96 and associated parts and rendering them readily accessible.

This also gives ready access to the venturi and nozzle and associated parts. The disposition of the cylinder 104 and associated parts, and the accelerating pump and associated parts, at opposite sides of and adjacent the main fuel nozzle, is particularly advantageous as providing a compact arrangement and one which can be readily produced at comparatively small cost, while also producing a carburetor which occupies comparatively small space. From a practical standpoint, this is an important consideration. In this connection, the arrangement of the walking beam or lever 96 having operating connections with cylinders 92 and 106, provides simple and effective means for operating the accelerating pump and actuating the economizer valve. It will also be noted that the screw 111, which regulates the downward movement of cylinder 106 and, consequently, the capacity of the accelerating pump, is adjustable independently of the operation of the economizer valve. The adjustment for regulating the accelerating pump does not, therefore, in any way affect the economizer which is brought into play automatically when operating at open throttle, as above described.

It will be noted that the lever or walking beam 96, as well as the plunger 128, are carried by the float chamber cover 28, and the piston 106 and cylinder 92 can be moved upwardly with cover 28. By removing upper section 2, it is possible to remove cover 28 of the float chamber and the walking beam 96 and associated parts, as well as the plunger 128, as a unit.

This quickly gives ready access to the parts of the accelerating pump, as well as to the economizer and the cylinder 104 and associated parts, for cleaning, repairs, or the like, which is highly advantageous.

We consider the provision of tube 54 and the relation of this tube and the parts associated therewith, particularly advantageous. It will be noted from Fig. 3 that the tube extends downwardly into well 48 to within a short distance of the lower end thereof, and the upper portion of passage 47*a* is substantially coincident with the under face of ring 53. When the engine has been in operation for an appreciable time, the carburetor becomes heated, with the result that the fuel is heated. This generates gases which tend to form bubbles in the fuel. If these bubbles are permitted to collect, as in a pocket, they will coalesce and form a body of gas of appreciable volume. When this body of gas enters the fuel nozzle, the flow of fuel therethrough is interrupted, which is highly objectionable. Also, when the carburetor is heated, and the engine is stopped, the fuel is apt to boil out through the fuel nozzle, which is highly objectionable for obvious reasons. We avoid both of these objections by our construction. Any gas bubbles which enter well 48, flow upwardly along the tube 54 and pass through openings 54*a*, entering the fuel stream and being thus removed as they form. In this connection, the individual gas bubbles formed are so minute as not to adversely affect the fuel feed to the nozzle, and by preventing any accumulation of these bubbles we eliminate possibility of interference with the fuel flow from this cause.

The tube 54 provides an additional head of fuel in the nozzle and tube, which is sufficient to prevent the fuel from boiling from well 48 out through nozzle 49 when the engine is standing, since if the bubbles are formed faster than they can escape through openings 54*a* they will pass upwardly through plug 59 to the float chamber rather than enter the tube 54 through its open lower end. In this manner we assure proper feed of fuel to the nozzle at all times, and prevent boiling of the fuel out of the nozzle.

What we claim is:—

1. In a carburetor, a body section having a main air passage therethrough, a fuel chamber, a venturi secured in the passage adjacent the upper end of the body section and the inner face of the surrounding wall of the body section being inclined downwardly and inwardly thereof, the inner face of the upper end of the venturi being similarly inclined and forming a continuation of the inclined upper portion of the surrounding wall of the air passage, and a fuel nozzle projecting into the venturi and communicating with said fuel chamber, said nozzle being inclined upwardly toward the upper body of the carburetor.

2. In a downdraft carburetor, a main air passage, a venturi therein, a fuel chamber, a nozzle projecting into the air passage through the wall of the venturi at the outlet end thereof and communicating with said chamber, an accelerating fuel pump communicating with the fuel chamber, a passage extending from the outlet of the pump and opening into the venturi, resilient means for closing said passage, and means responsive to and actuated by variations in suction in the main air passage for operating the pump.

3. In a carburetor, a main air passage, a venturi in the air passage, a fuel chamber, a nozzle extending into the venturi and communicating with said chamber, an accelerating fuel pump having its intake communicating with the fuel chamber, an accelerating passage opening into the venturi and leading from the discharge of the pump, a valve normally closing said passage, and energy storing means connected to the air passage and actuated by variations in suction therein, said means having operating connection with the accelerating pump.

4. In a carburetor, a main air passage, a throttle valve controlling said passage, a venturi in the air passage, a fuel chamber, a fuel nozzle extending into the venturi and communicating with said chamber, an accelerating fuel pump having its

intake communicating with the fuel chamber, an accelerating passage leading from the discharge of the pump and opening into the venturi, a cylinder, a piston operating in the cylinder, a spring urging the piston upwardly in the cylinder, operating connections between the piston and the accelerating pump for discharging fuel therefrom into the accelerating passage when the piston is raised, and a passage establishing communication between the space beneath the piston and the main air passage at the low pressure side of the throttle valve.

5. In a carburetor, a main air passage, a throttle valve controlling the passage, a venturi therein, a fuel chamber, a nozzle communicating with said chamber and extending into the venturi, an accelerating fuel pump at one side of the nozzle and having its intake in communication with the fuel space of the fuel chamber, an accelerating passage leading from the discharge of the pump and opening into the venturi, a cylinder at the other side of the nozzle, a piston operating in the cylinder, a spring urging the piston upwardly in said cylinder, operating connections between the piston and the pump for forcing fuel into said accelerating passage when the piston is raised, and a passage establishing communication between the space beneath the piston and the main air passage at the low pressure side of the throttle valve.

6. In a carburetor, a main air passage, a venturi in said passage, a fuel chamber, a fuel nozzle communicating with the chamber and projecting into the venturi, an accelerating fuel pump having its intake communicating with the fuel space of said chamber, an accelerating fuel passage extending from the discharge of the pump and opening into the venturi, a throttle valve controlling the main air passage, means including a piston subject to suction at the low pressure side of the throttle valve and a spring acting on the piston in opposition to such suction, operating connections between said piston and the accelerating pump for forcing fuel into the accelerating passage when the piston is moved by the spring, adjustable means for limiting movement of the piston by suction, a supplemental passage for supplying fuel to the fuel nozzle, a valve normally closing said supplemental passage, and means for opening said valve when the piston is moved into its extreme position by its associated spring, said means being actuated by the operating connection between the piston and the fuel pump and being unconnected thereto.

7. In a carburetor, a main air passage, a venturi in the passage, a throttle valve controlling said passage, a fuel chamber, a fuel nozzle, a passage establishing communication between the nozzle and the chamber, said nozzle extending into the venturi, an accelerating fuel pump communicating at its intake with the fuel space of the fuel chamber, an accelerating fuel passage leading from the discharge of the pump and opening into the venturi, means including a piston subject to suction at the low pressure side of the throttle valve and a spring acting on the piston in opposition to such suction, a lever fulcrumed intermediate its ends, operating connections between the ends of the lever and the piston and the pump, respectively, a supplemental passage for supplying fuel from the fuel chamber to the fuel nozzle, a valve normally closing said supplemental passage, and means including a plunger for opening said valve, said plunger being disposed beneath and in alignment with the lever arm intermediate the fulcrum of the lever and the connection thereof to the pump to be depressed by said arm of the lever for opening the valve when the piston is moved into its extreme position by the action of its associated spring.

8. In a carburetor, an upper section and a lower body section, the upper section having an air passage therethrough and the lower section having an air passage therethrough of less diameter than the air passage of the upper section, a venturi in the lower section adjacent the upper end thereof, the upper end portion of the venturi being inclined upwardly and outwardly and the upper portion of the surrounding wall of the lower section being inclined upwardly and outwardly to the lower end of the air passage in the upper section and forming a continuation of the upper end wall of the venturi, a fuel chamber, and a fuel nozzle communicating with the chamber and extending into the venturi in an upward direction toward the larger air passage.

9. In a carburetor, a body section and an air horn section having aligned air passages forming the main air passage of the carburetor, a venturi in the air passage, a fuel chamber, a nozzle communicating with the chamber and extending into the venturi, an accelerating fuel pump having its intake communicating with the fuel space of the chamber, a piston for operating said fuel pump, a cover for the fuel chamber, means including a lever secured to said piston for operating the fuel pump mounted on said cover, and a housing carried by the air horn section and enclosing said lever, the air horn section and the housing carried thereby being detachably secured to the body section and removable therefrom as a unit.

10. In a carburetor, a body section and an air horn section detachably secured thereto, said sections having aligned air passages forming the main air passage of the carburetor, a throttle valve controlling the main air passage, a venturi in the air passage, a fuel chamber, a fuel nozzle communicating with said chamber and extending into the venturi, an accelerating fuel pump having its intake communicating with the fuel space of the fuel chamber, an accelerating fuel passage leading from the discharge of the pump and opening into the air passage, a cylinder secured at its lower end to the body section, a piston operating in the cylinder, the space beneath the piston being connected to the air passage at the low pressure side of the throttle valve, a cover removably secured over the fuel chamber, a lever fulcrumed intermediate its end on the cover, yielding means acting to move the piston in opposition to the suction exerted thereon, operating connections between the lever and the piston and the pump, the upper end of the cylinder being removably seated in the under face of the cover of the fuel chamber and the piston being removable from its associated cylinder by relative upward movement with the cover of the fuel chamber, the member of the pump to which the lever is connected being similarly removable.

11. In a carburetor, a lower body section and an upper air horn section removably secured to the body section, said sections having aligned air passages forming the main air passage of the carburetor, a fuel chamber, a removable cover for said chamber, a fuel nozzle communicating with the fuel space of the chamber and extending into the air passage, an accelerating fuel pump having its intake communicating with the fuel space of the fuel chamber and including a piston and a

cylinder slidable thereon, a lever pivoted on the cover of the fuel chamber and having operating connection with the cylinder of the accelerating fuel pump, a cylinder open at its upper end and removably seating in the under face of the cover of the fuel chamber cover, a piston operating in the second cylinder, operating connections between the piston in said second cylinder and the lever, a passage connecting the second cylinder at one side of the piston therein to the air passage of the carburetor, and means acting in opposition to the suction created for moving the piston in said second cylinder in the opposite direction.

12. In a carburetor, a float chamber, an inclined fuel well positioned below the float chamber and having an upper wall inclined in such direction as to divert bubbles toward the float chamber, a fuel passage connecting the float chamber and well, and a fuel nozzle comprising an inclined tube projecting through said upper wall to a point adjacent the bottom of the well, said tube being provided immediately adjacent said wall with minute openings.

13. In a carburetor, a float chamber, an inclined fuel well positioned below the float chamber and having an upper wall inclined in such direction as to divert bubbles toward the float chamber, a fuel passage connecting the float chamber and well and having an upper surface substantially forming a continuation of said wall, and a fuel nozzle comprising an inclined tube projecting through said wall to a point adjacent the bottom of the well and having an open lower end, and a metering orifice in said fuel passage designed to permit the passage of fuel from the float chamber to the well and of vapor from the well to the float chamber.

14. In a carburetor, a body portion having an air passage therethrough, a venturi in said air passage, a fuel chamber, a fuel discharge nozzle located in the restricted zone of said venturi, a fuel passage leading from the fuel chamber and inclined upwardly and inwardly within the venturi and terminating in said discharge nozzle, said discharge nozzle being formed with horizontally extending outlet openings supplied from said fuel passage and with projecting lips at said outlet openings.

15. In a carburetor, an acceleration device comprising a cylinder subject to varying suction developed in the operation of the carburetor, a piston in the cylinder, a spring urging said piston in one direction in opposition to the force of said suction, a fuel pump actuated by the piston, and an adjustable member projecting into the piston to limit the stroke of the piston and thus limit the output of the pump.

MILTON E. CHANDLER.
DON COLE.

CERTIFICATE OF CORRECTION.

Patent No. 1,957,631. May 8, 1934.

MILTON E. CHANDLER, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 31, for "Cylinder" read Piston; and line 39, for "Piston" read Cylinder; and page 5, line 5, after "also" insert the word be; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of March, A. D. 1935.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.

DISCLAIMER

1,957,631.—*Milton E. Chandler*, La Grange, and *Don Cole*, Chicago, Ill. CARBURETOR. Patent dated May 8, 1934. Disclaimer filed March 26, 1941, by the assignee, *Bendix Aviation Corporation*.

Hereby enters this disclaimer to claim 14.

[*Official Gazette April 15, 1941.*]