April 14, 1942. G. V. LEHEW 2,279,626

CARBURETOR

Filed Oct. 2, 1939 3 Sheets-Sheet 1

Fig. 1.

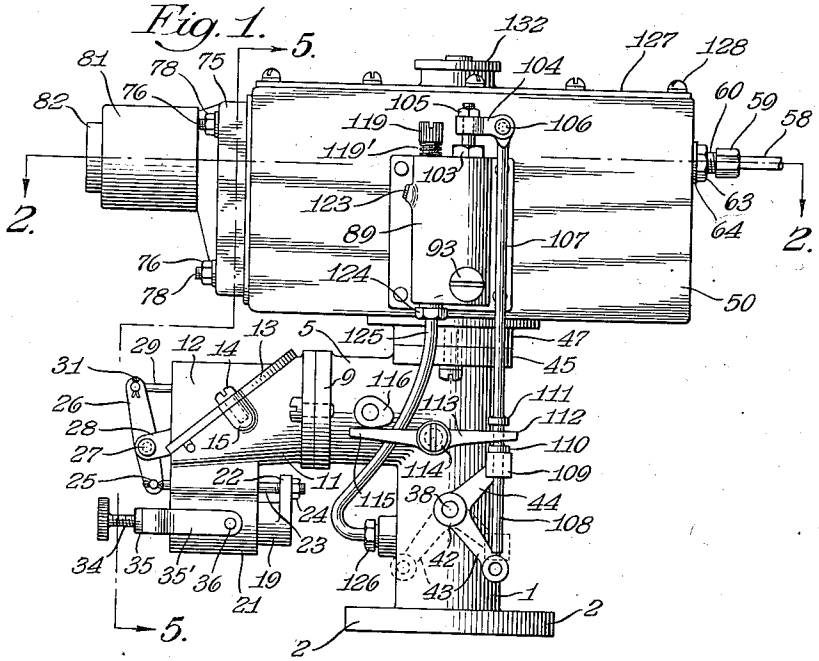
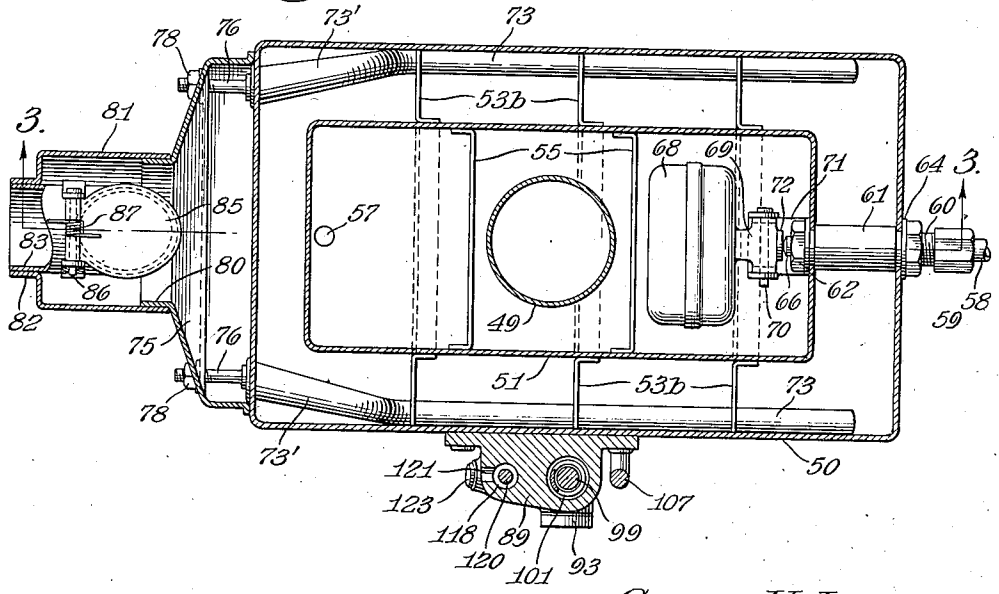


Fig. 2.



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CARBURETOR

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Fig. 3.

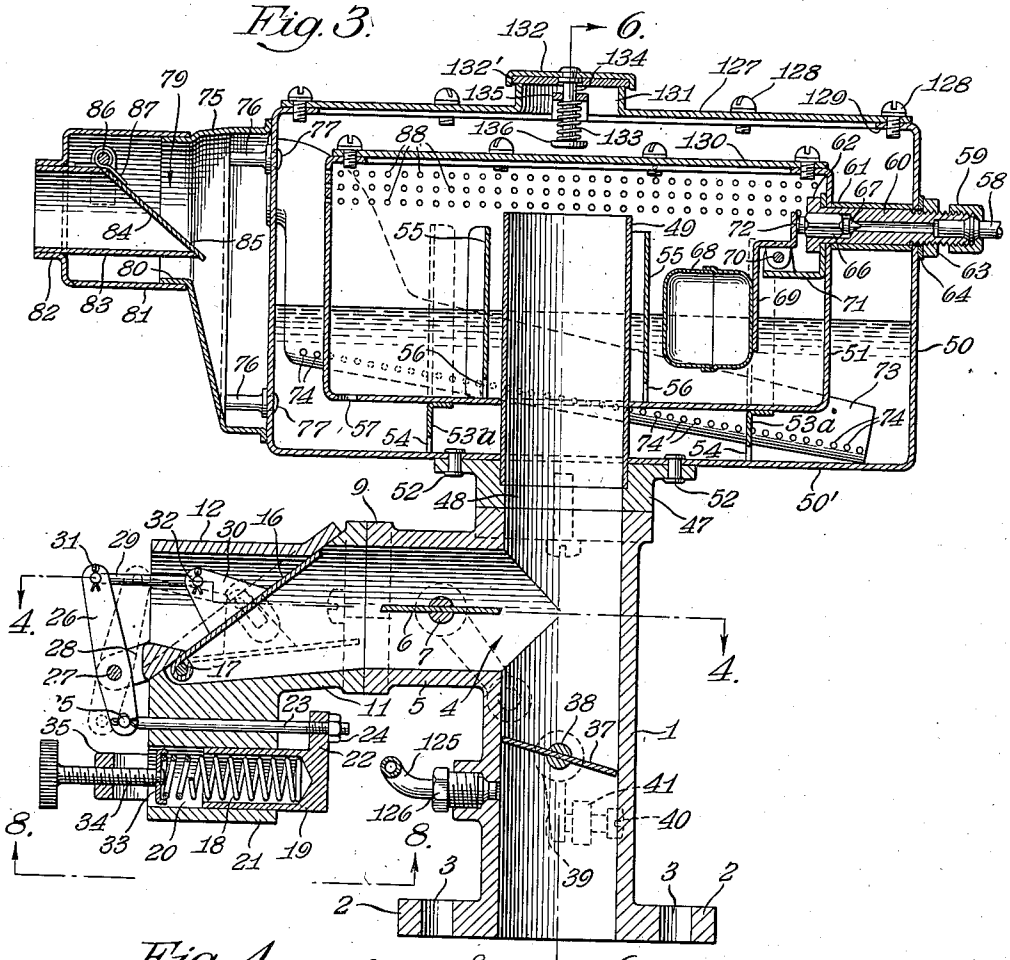
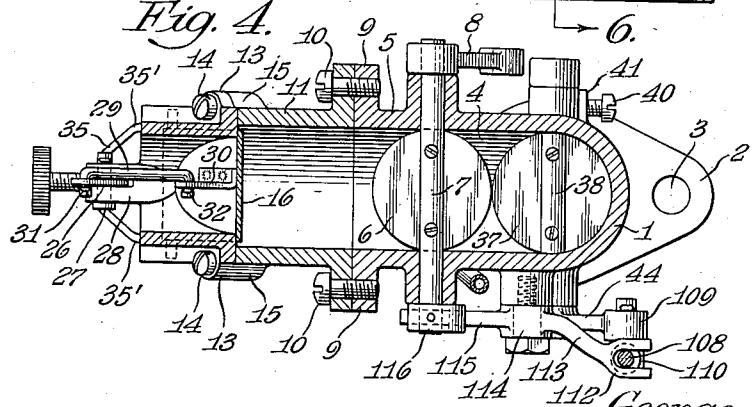


Fig. 4.



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CARBURETOR

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Fig. 5.

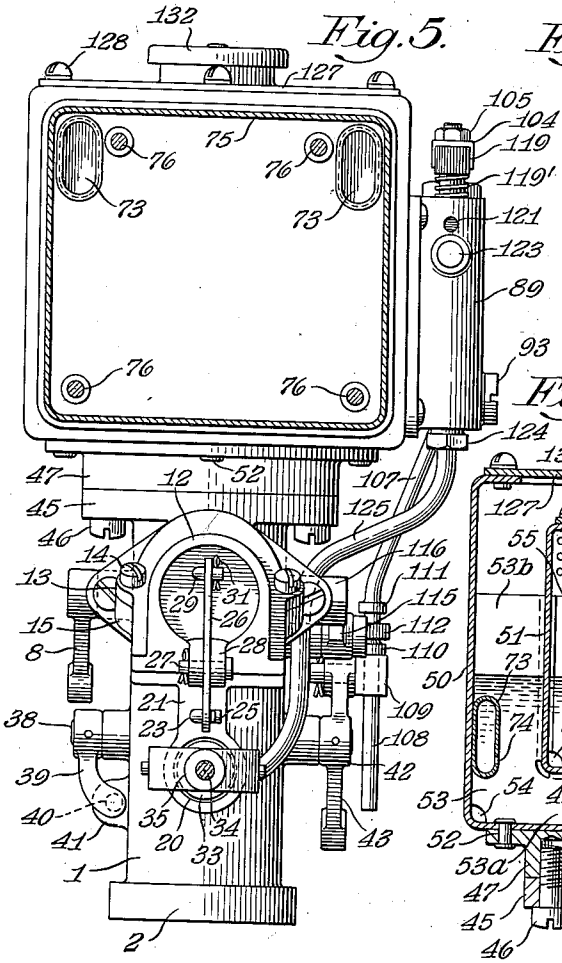


Fig. 7.

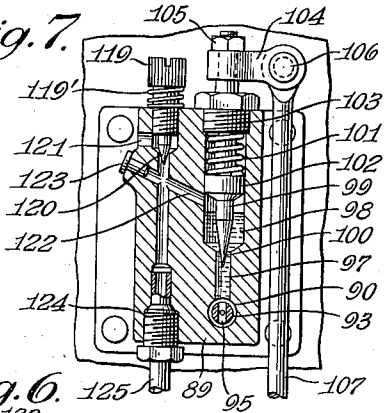


Fig. 6.

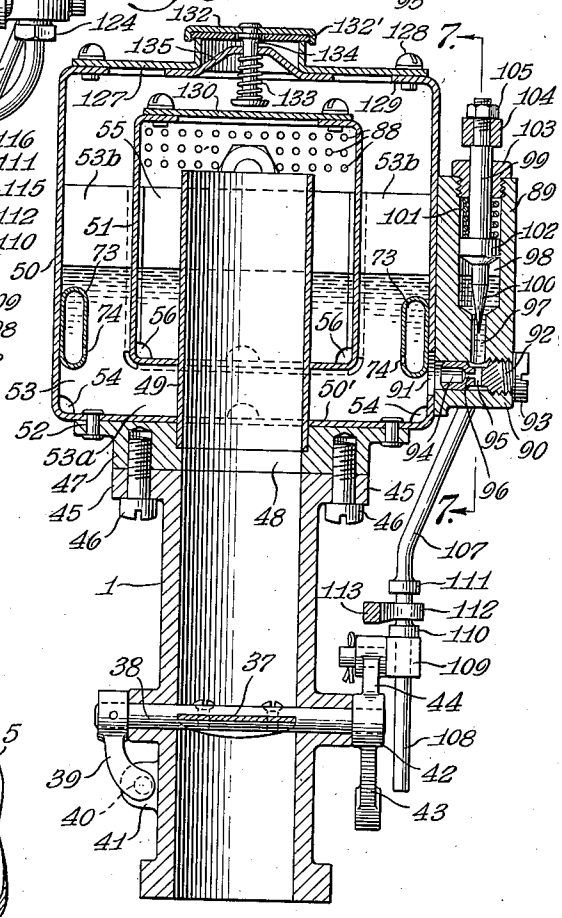
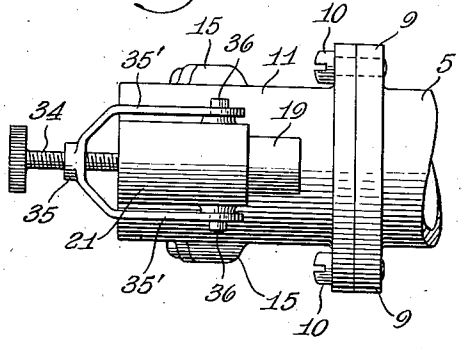


Fig. 8.



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Patented Apr. 14, 1942

2,279,626

UNITED STATES PATENT OFFICE

2,279,626

CARBURETOR

George V. Lehew, Belle Vernon, Pa.

Application October 2, 1939, Serial No. 297,615

1 Claim. (Cl. 261—41)

This invention relates to carburetors and has for its prime object to improve generally upon such devices for use in connection with a supply of vaporized fuel for general use but more particularly for use in connection with internal combustion engines installed on motor vehicles and the like.

A particular object is to provide a more practical and efficient construction and arrangement of parts to attain an ideally proportioned and balanced mixture of air and gas in the operation of an internal combustion engine or other utility operating under the agency of vaporized fuel combustion under all load conditions and speeds in operation.

Another object is to simplify the structure by the minimization of separate parts and in the assemblage of the parts in separate unitary and detachable sections so as to gain ready access to the respective parts for the necessary adjustment, repair and renewal thereof, as occasion may require, and to minimize the cost of production as well as the time required for the assembling of the structure.

With the foregoing and other objects and advantages to be attained, as will hereinafter more fully appear, the invention consists in the novel general structure and in the particular parts and combinations and arrangements of parts thereof as hereinafter described and set forth in the appended claim, reference being had to the accompanying drawings illustrating a practical adaptation of the invention, in which,

Figure 1 is a side elevation of the complete carburetor assembly;

Figure 2 is a horizontal section, on an enlarged scale, taken on the line 2—2 of Figure 1;

Figure 3 is a vertical section taken on the line 3—3 of Figure 2;

Figure 4 is a horizontal section on the line 4—4 of Figure 3;

Figure 5 is a view of the complete carburetor assembly partly in end elevation and partly in section on the line 5—5 of Figure 1;

Figure 6 is a vertical section on the line 6—6 of Figure 3;

Figure 7 is a fragmentary view, in section, on the line 7—7 of Figure 6; and

Figure 8 is a fragmentary view, in inverted plan, of the auxiliary air inlet extension of the main suction column of the carburetor, looking in the direction of the arrows on the line 8—8 of Figure 3 and illustrating details of the hinged mounting of the yoke member carrying the adjusting screw for the controlilng spring for the valve in said auxiliary air inlet extension.

Referring now to the drawings in detail, the numeral 1 designates a tubular fitting constituting the main support for the carburetor assembly as well as the base member of a vertical main suction column, the upper member of which is detachably secured thereto as will be later more fully described. This base member 1 is flanged at its lower end to provide oppositely disposed lugs 2 which are obviously apertured, as at 3, for the reception of conventional securing bolts or screws by means of which the base member 1 is communicably attached to the inlet portion of the manifold which supplies the combustible mixture to the engine or other utility to be operated.

The base member 1 is provided near its upper end with a lateral auxiliary outside air inlet opening 4 which is surrounded by a tubular extension 5 provided with a manually controlled valve 6 of the rotatable disk or plate type for varying the intake capacity of said extension 5, the pintle 7 of said valve being provided at one end thereof, outside the tubular extension 5, with a crank arm 8, which, in the installation of the carburetor, is connected by an operating rod (not shown) in the usual manner to an operating knob or lever located on the instrument board of the vehicle or on the steering post or column within convenient reach of the driver.

The outer end portion of the tubular extension 5 is flanged to provide diametrically opposed lugs 9, said lugs 9 being apertured and screw-threaded for the reception of screws 10 for the attachment thereto of a correspondingly apertured flange or lug portion of an outer tubular extension 11, the bore of which is alined communicably with that of said tubular extension 5. The tubular extension 11 is truncated or cut off obliquely to receive a correspondingly truncated semi-cylindrical complemental member 12 having a marginally flanged portion 13 which is apertured at opposite sides thereof for the reception of screws 14 which are inserted into screw-threaded openings provided therefor in lugs 15 located externally on the extension 11 contiguous to the margin of the truncated portion thereof. The member 12 carries a leaf or plate valve 16 which is hingedly attached thereto, as at 17, and is of ample dimension to entirely cover the opening of the member 12 when the valve is in closed position, in which position it is normally held under the influence of a

spring element 18 and the intermediate lever and link connections to be now described.

As shown, the spring element 18 is located in a barrel 19 which is slidably mounted for longitudinal reciprocation in an open-ended bore 20 provided therefor in a block or lug 21 extending downwardly from the tubular extension 11. One end portion of the barrel 19 which projects beyond the block or lug 21 is closed and provided with a lateral extension 22 which is apertured and screw-threaded for the reception of the correspondingly threaded end portion of a rod 23, said rod being adjustable longitudinally in relation to the extension 22 of the barrel 19 and releasably fastened in such adjustment by a jam nut 24 provided on the projected end portion of the rod and tightened against the outer face of the extension 22. The rod 23 is slidable freely through a bore provided therefor in the lug 21 of the tubular extension 11 just above the bore 20, and at its end opposite to that which is attached to the extension 22 of the barrel 19 the rod is pivotally attached, as at 25, to the lower end of an oscillatory lever 26 which is pivotally mounted, as at 27, on a bracket extension 28 of said complemental member 12. In this connection, it is noted that limited elongation of the aperture in the lever 26 is provided for sufficient movement of the pivot pin or bolt 25 in the line of the longitudinal axis of the lever to compensate for the arcuate movement of the lever end portion during longitudinal reciprocation of the rod 23. The upper end portion of the lever 26 is connected by a link bar 29 to a lug 30 provided on the outer face of the valve member 16, said bar 29, as shown, having one end portion turned at a right angle to the main body portion thereof and inserted in an aperture provided therefor in the lever 26 where it is held in place by a conventional cotter pin, as at 31, the opposite end portion of the bar being similarly formed and secured in an aperture portion of the lug 30, as at 32. By the aforesaid lever and link connection between the valve member 16 and barrel 19, said elements 16 and 19 are movable the one by and with the other.

The spring element 18 is inserted in the bore of the barrel 19 with its inner end abutting the bottom of the bore, the opposite end portion of said spring element extending some distance beyond the open end of the barrel 19 and abutting a marginally flanged circular stop plate 33 which is swiveled axially on the inner end of a supporting and adjusting screw 34 which works in a correspondingly threaded opening in a yoke member 35, the leg portions 35' of which are pivotally mounted on diametrically opposed trunnions 36 provided on opposite sides of the bored portion 20 of the lug 21 on the air intake extension 11. Normally, the yoke 35 is in a horizontal position with its leg portions 35' parallel with the longitudinal axis of the bore 20 so that the screw 34 is in axial alinement with the spring element 18 and may be adjusted longitudinally on the yoke member so as to vary the tension of the spring element, yet when it is necessary or desirable to remove and replace the spring element and in the renewal thereof in case of repairs, the screw 34 can be turned in the yoke 35 to move it in the direction to withdraw the stop plate 33 from the bore 20 of the lug 21 and to a distance beyond the end thereof sufficient to permit the yoke to be swung downwardly on the trunnions 36 and out of the way so that access may be had for the removal and replacement of the spring element 18 without having to dismantle the air inlet extension 11 with relation to the lateral tubular extension 5 of the base member of the suction column 1 or disconnecting the parts of the lever and link connection between the valve member 16 and barrel 19.

In the structure shown in the accompanying drawings, the vertical body portion of the tubular base member 1 has the usual throttle valve 37 located therein with its pintle 38 in a plane some distance below the lateral air inlet opening 4, one end portion of the pintle, externally of the base member 1, being provided with a depending inturned arm 39 (see Figure 6) which engages the end of a stop member 40 in the closed position of the valve, said stop member, as shown, comprising a screw stud mounted on a supporting lug 41 provided on an adjacent portion of the base member 1. By adjusting the stop member 40 longitudinally in the lug 41 its inner end may be variably located to stop the arm 39 in different angular positions relative to the axis of the pintle 38 to vary the degree to which the throttle valve 37 is positioned with closing effect in the bore of the base member 1 between a fully closed and partially opened position. The opposite end portion of the pintle 38 of the throttle valve 37 is provided with a bellcrank 42, one arm 43 of which is connected by an operating rod (not shown) in a conventional manner to an accelerator pedal or a hand lever or other suitable manually operable element, or to both, in accordance with the common practice in the control of carburetors on motor vehicles and the like. The opposite arm 44 of the bellcrank 42 is utilized in the operation of idling speed control means provided in the carburetor assembly in accordance with the present invention, as will be later more fully described.

The tubular base member 1, which, as hereinbefore described, constitutes a support for the entire superstructure of the carburetor as well as a base member for the main suction column, is flanged at its upper end to provide a diametrically opposed pair of lugs 45 which are apertured for the reception of securing screws 46 by which a flanged coupling member 47 is attached to the base member 1, said coupling member 47 having a central opening 48 therein, of a diameter substantially the same as the bore of the base member 1 and registering communicably therewith, said opening 48 being counterbored from the top of the coupling member 47 and having the lower end portion of an open-ended tubular cylinder 49 fitted tightly and supportedly therein, the bore of said cylindrical member being of the same diameter as that of the opening 48 in the coupling member 47 and the bore of the base member 1. This cylindrical member 49 extends through the bottom of a rectangular outer carburetor shell 50 and through the bottom of an inner rectangular reservoir shell 51 and terminates at its upper end short of the top wall of the inner shell for a purpose to be later more fully described.

The flat bottom 50' of the outer shell 50 which provides the main carbureting chamber of the device, is riveted, as at 52, or otherwise secured with leaktight effect to the marginally flanged portion of the coupling member 47 the top face of which is flat throughout the extent thereof. The inner shell 51, which is of considerably smaller dimensions in length, breadth and height than the outer shell 50, is supported within the outer shell with the bottom, top, side and end walls of the two shells spaced apart throughout

the entire extent thereof by transverse baffle partitions 53, there being preferably three thereof as shown more clearly in Figure 2 of the drawings. As shown, these baffle partitions are of substantially U-shape, the horizontal intermediate portions 53a of the baffles extending with a tight marginal fit between the bottoms of the inner and outer shells and the vertical leg portions 53b of the baffles extending and fitting likewise tightly between the side walls of the inner and outer shells. The upper ends of the vertical portions 53b of the baffle partitions terminate in a plane short of that of the top of the inner shell but above the level of the liquid in the outer shell, and, as shown, the only openings in said baffle partitions establishing communication between the spaces therebetween and between the endmost partitions and end walls of the outer shell are provided by the arcuate cutaway portions 54 at the two opposite lower corners of the partitions (see Figure 6). To hold the baffle partitions in place they are obviously soldered, welded or otherwise secured to the adjacent wall portions of the inner and outer shells 50 and 51, respectively. By this provision and arrangement of the baffle partitions backward and forward movement of the liquid fuel in the outer shell 50 and the splashing thereof is practically prevented yet the lower corner openings in the partitions afford ample intercommunication to normally maintain the liquid in the several compartments at the same level.

The inner shell 51 is also provided with transverse baffle partitions 55, only two of which being provided in the structure shown, inasmuch as the inner shell is of lesser length than the outer shell. However, as far as the present invention is concerned, the number of the baffles 53 and 55 may be obviously varied as is found necessary or desirable. As shown, the upper ends of the baffle 55 which are of rectangular form and extend from side wall to side wall of the inner shell 51, terminate in the same plane as the upper ends of the vertical portions 54b of the baffles 53. The baffles 55 are also provided with lower corner openings 56 for the establishment of liquid flow communication therebetween and between them and the end walls of the inner shell 51 similarly as the openings 54 are provided in the outer baffles 53.

The inner shell 51 constitutes the working reserve supply reservoir for the liquid fuel which is delivered therefrom into the surrounding lower part of the outer shell 50 through an outlet opening 57 provided in the bottom of the inner shell 51 adjacent one end thereof, preferably the rear end with relation to the longitudinal positioning of the carburetor body in the direction of travel of the motor vehicle, which is the preferred and more practical arrangement of the carburetor shells 50 and 51 with relation to the air intake provision to be later more fully described. However, while this location of the opening 57 is of material advantage in the operation of the carburetor it is not absolutely essential to the successful operation thereof.

The liquid fuel is delivered into the inner shell 51 from a pipe 58 leading from a main supply tank (not shown) in the customary manner. As shown, the discharge end of the pipe 58 is attached by a gland nut 59 to the outer end of a nipple member 60 which is extended through a tubular strut member 61 located between the adjacent end wall portions of the outer and inner shells 50 and 51, said nipple member 60 having a headed inner end portion 62 and being provided on its externally screw-threaded projecting outer end portion with a jam nut 63 which is tightened against the adjacent end wall portion of the outer shell 50 with a sealing washer 64 interposed therebetween. The inner end portion of the bore 65 of the nipple member 60 is counterbored for the reception of a reciprocatory valve element 66, the main body portion of which is formed with longitudinal ribs for guiding the element in the enlargement of the bore 65 and permitting free passage of the liquid fuel therebetween. This valve element 66 is provided at its inner end with a reduced axial extension 67 which is tapered at its end to seat against the shoulder at the base of the enlargement of the bore 65 so as to shut off the flow through the bore when the valve is in its closed position, in which position it is held under the influence of a float element 68 when the liquid in the shell 51 is at a predetermined maximum level. As shown, the float element 68 comprises a hollow sheet metal shell of generally rectangular form but with rounded corners, which is attached to and carried by an angular lever member 69 which is hingedly mounted, as at 70, on the horizontal arm of a supporting bracket 71, the vertical arm of which is apertured and fitted on the nipple member 60 and is clamped between the head 62 of said nipple member and the adjacent end wall portion of the shell 51. The upper end portion 72 of the lever member 69 abuts a reduced end extension of the valve element 66 so as to hold said valve element in its closed position when the float element 68 is lifted as the liquid reaches its maximum level in the shell 51 and restricting the opening movement of the valve element when the liquid falls below such level, that is to say, the movement of the portion 72 of the lever member 69 away from the nipple member 60 is limited because of the correspondingly limited movement of the lower portion of the lever member carrying the float element 68 towards the end of the horizontal arm of the supporting bracket 71.

The provision of the inner shell 51 as a working reserve supply reservoir for the liquid fuel, located as it is within the carbureting chamber afforded by the outer shell 50 and containing the float element which controls the valve element 66 of the pipe connection between the carburetor and the main liquid fuel supply tank, is an important feature of the present invention, in that turbulence of the liquid in the inner shell 51 is practically nil or at least greatly minimized as compared to the turbulence of the liquid in the outer shell 50 during the operation of the carburetor. That is to say, with the float element 68 located as it is within the shell 51, there is no appreciable fluttering of said element tending to cause chattering or intermittent opening and closing of the valve element 66 in quick succession while the liquid in the shell 51 is at or near its maximum level as would occur if the float were in the body of liquid in the outer shell 50 where the aeration of the liquid is occurring in the operation of the carburetor as will be presently more fully described.

At opposite longitudinal sides of the outer shell 50 are air ducts 73, said ducts, as shown more clearly in Figures 5 and 6, comprising flattened tubes which are closed at one end terminating in proximity to one end wall of the shell 50 (the front end in an installation on a motor vehicle), the opposite ends of the tubes being open and

marginally flanged and being secured with leak-tight fit in vertically elongated elliptical openings provided therefor in the opposite end wall of the shell **50**. As shown, these ducts **73** are first offset downwardly and laterally towards the longitudinal side walls of the shell **50**, as at **73'**, and thence inclined downwardly to their closed ends which rest on the bottom **50'** of the shell **50**. They are also tapered in the same direction, or, stating it another way, said ducts **73** are vertically flared from their closed inner ends to their open outer ends. In this connection, it is noted that, in accordance with the operating principle of the present invention, the closed end portions of the ducts **73** are contiguous to the bottom **50'** of the shell **50** and the adjacent end wall of the shell, which, as just above noted with reference to the installation of the carburetor on a motor vehicle, is the front end wall in relation to the general direction of forward travel of the vehicle, the vertically widened open end portions of the ducts being at an elevation a substantial distance above the maximum level of the liquid in the shell **50**, but the portions of the ducts at the bottoms of said offset upper portions are below the liquid level so that, when the shell **50** is substantially horizontal, as it normally is, the major lower portions of the ducts next adjacent the rear end wall of the shell are immersed to a considerable depth in the liquid fuel, yet the parts of the upper portions of the ducts next adjacent the open ends thereof are above the body of liquid (see Figure 3). Hence, it is assured that the apertured portions of the ducts **73** are always immersed, but when the vehicle is traveling upgrade at a comparatively steep incline, it is further assured that the several minute apertures **74** nearest the open end of the ducts are immersed still deeper in the body of the liquid fuel. This is of material advantage in producing the proper combustible mixture when an engine is laboring in the upgrade pull with a heavy load on the vehicle. The series of apertures **74**, as shown, are located in the inner side walls of the ducts **73** adjacent the bottoms of the ducts, or, obviously, they may be located directly in the bottoms, but in any case, it is essential that they be at least in close proximity to the bottoms of the ducts, so that upon starting operation of the carburetor, the ducts are quickly freed of any liquid which may have accumulated therein while the carburetor was not in use.

At the end of the outer shell **50**, where the ducts **73** are open to communication through the wall thereof, is an air intake manifold casing **75**, which, as shown, is formed, as a cup, from sheet metal and detachably secured to the end wall of the shell **50** by studs **76** which are formed with base flanges at their inner ends and riveted to the wall of the shell **50**, as at **77**, said studs being projected through apertures provided therefor in the manifold casing **75** and screw-threaded for the reception of securing nuts **78** which are tightened against the casing so as to clamp it with its marginal portions tightly against the adjacent outer face portion of the end wall of the shell **50**. An object in locating the open ends of the ducts **73** as high above the maximum liquid level in the shell **50** as shown and described is to prevent flow of the liquid from the shell **50** into said casing **75**, at all times, whether the shell **50** is in a horizontal position during substantially level travel or inclined as when the motor vehicle is traveling upgrade.

The air intake manifold casing **75** is provided with an inlet opening **79** in the upper portion of its end wall which is marginally flanged, as at **80**, for the reception and support of a cylindrical cupped member **81** having an opening in its end wall which is flanged, as at **82**, in which opening is fitted an open-ended tube **83**, the lower portion of which projects into the inlet opening **79** of the air intake manifold casing **75**. Preferably, as shown, the tube **83** is truncated or cut off obliquely, as at **84**, and a leaf valve **85**, hinged as at **86**, to the upper portion of the tube **83**, is provided for controlling the passage of the air through the tube, said valve being yieldably held in closed position by a spring element **87** and opening to different degrees as the suction varies within the carburetor during the operation thereof and accordingly admits more or less air into the manifold casing **75** from the tube **83**.

The inner shell **51** is provided in its longitudinal side walls and transverse end walls with a multiplicity of minute apertures **88** arranged in parallel horizontal rows near the top of the shell, through which communication is established between the outer shell **50** and the inner shell **51** for the passage of mixed air and vaporized liquid from the upper space in the outer shell **50** into the upper portion of the inner shell **51**, whence it passes out of the shell **51** through the suction column, the upper portion of which comprises the tube **49** whose upper end terminates some distance below the top of the shell **51** but a considerable distance above the maximum level of the liquid fuel in said shell.

In the operation of the carburetor as thus far described, the throttle valve **37** is opened in the usual way when the engine is started, at which time the auxiliary air inlet valve **6**, controlling the lateral air inlet opening **4** of the tubular base member **1** of the suction column, may be closed or set in a partially open position, whereupon the suction created in the alined and joined column members **1** and **49** causes air to be drawn into the intake manifold casing **75** and into the downwardly inclined ducts **73**, from which it is distributed through the apertures **74** of the ducts into the body of liquid fuel in the outer shell **50**. The air thus distributed travels upwardly through the body of liquid, creating turbulence therein and carrying with it globules of the liquid into the upper space in the shell **50**, whence the admixed air and vapor thus created is passed through the minute aperture **88** in the upper wall portions of the inner shell **51**, thereby further breaking up the minute globules and effecting a more thorough mixture of air and vapor which is drawn out of the upper portion of the inner shell **51** downwardly through the suction column and thence into the fuel intake manifold of the internal combustion engine or utility in which the combustible mixture is used. In this connection, it is here noted that, after operation of the engine begins, the auxiliary air inlet valve **6** is opened fully so that the air taken into the suction column through the lateral opening **4** is entirely under the control of the valve **16** which is normally spring-urged to closed position but opens to a degree according to the power of the suction created in the column under the different speeds and load conditions to which the carburetor is subjected in the operation of the engine.

While the carburetor as thus far described operates with high efficiency and ideal advantage in producing a properly proportioned combustible

mixture in the regular operation of the engine at different speeds and under various load conditions, special provision is made for operating the engine at idling speed and also for facilitating the starting of the engine under certain conditions where the proper combustible fuel mixture is not immediately attainable. This is accomplished by providing a by-pass for the liquid fuel from the outer shell 50 with means for mixing a proportionate amount of air with the by-passed liquid and conducting the mixture into the lower part of the suction column below the throttle valve 37. As shown, a unitary attachment including a block 89 is mounted on one of the longitudinal side walls of the outer shell 50, said block having a transverse horizontal bore 90 in its lower portion which communicates with the interior of the shell 50 through a port 91. The outer end portion of the bore 90 is counterbored and screw-threaded to receive the correspondingly threaded enlargement 92 of a flow-controlling plug 93 whose inner end portion fits snugly in the non-threaded portion of the bore 90 and is provided with an axial bore 94 in its inner end, said bore 94 communicating with a transverse bore 95 in the plug through a restriction 96 at the base of said bore 94. The portion of the plug 93 in the region where the transverse bore 95 occurs is reduced in outside diameter so as to provide an annular space between the plug and the adjacent wall portion of the bore 94 for establishing communication between said transverse bore 95 and a vertical bore 97 in the block 89, said bore 97 being enlarged in the upper portion of the block, as at 98. Working in the bore enlargement 98 is a needle valve element 99, the lower end portion of which is tapered with considerable elongation, as at 100, so as to enter the bore portion 97 of smaller diameter and seat against the shoulder at the upper end thereof. A spring 101, coiled about the needle valve 99 between a collar 102 formed thereon and a screw plug 103 fitted in the upper end portion of the bore enlargement 98, is constantly under compression and reacts to urge the valve element into closed position.

The valve element 99 is provided at its upper end with a lateral arm 104 which, preferably as shown, comprises a separate piece which is apertured to fit on a reduced portion of the valve stem, which latter is screw-threaded for the reception of a securing nut 105 by which said arm 104 is held tight against the shoulder at the base of said reduced portion of the stem. To the outer end of the arm 104 is pivotally attached, as at 106, an operating rod 107, which depends therefrom in a general vertical direction, but the lower end portion 108 of the rod being offset inwardly towards the base member 1 of the suction column and fitted slidably in a swivel block 109 mounted on the arm 44 of the hereinbefore described bell-crank 42 which is fixed on the pintle 38 of the throttle valve 37. Said inwardly offset portion 108 of the rod 107 is provided with an annular enlargement 110 which is engaged on its underside by the swivel block 109 when the throttle valve 37 is closed, whereby the rod 107 is lifted and the attached needle valve element 99 is accordingly raised from its seated engagement at the upper end of the smaller vertical bore 97 in the block 89. However, when the throttle valve 37 is opened and the arm 44 of the bell-crank 42 accordingly lowered, the swivel block 109 on the arm 44 moves away from the shoulder 110 of the rod 107 and the spring 101 moves the needle valve element 99 into seating engagement in the upper end portion of the smaller bore 97, thereby closing said bore and keeping it closed during the regular operation of the carburetor as first herein described.

Spaced above the annular shoulder 110 is an opposed similar shoulder 111, and between the two shoulders the bifurcated end portion 112 of a rocking lever 113 straddles the intervening portion of the rod 107, said lever 113 being pivotally mounted, as at 114, on the base member 1 of the main suction column of the carburetor and having its opposite end portion 115 projected beneath a cam member 116 which is fixed on the adjacent end portion of the pintle 7 of the auxiliary air inlet valve 6. In the fully opened position of said valve 6, the cam 116 is set with its high peripheral portion substantially in horizontal alinement with the axis of the pintle 7 and out of contact with the arm 115 of said rocking lever, at which time the arm 115 is in engagement with the concentric lower portion of the cam member and the bifurcated end portion 112 is in a neutral position in spaced relation to both of the annular shoulders 110 and 111 of the operating rod 107, thereby permitting operation of said rod 107 independently of said rocking lever. However, when the valve 6 is moved to closed or partially closed position, the bifurcated end portion 112 of said rocking lever 113 engages the underside of the upper shoulder 111 of the rod and thereby lifts the rod and the attached needle valve 99 so as to unseat the latter from the upper end of the lower bore 97 in the block 89.

When the needle valve 99 is unseated the liquid fuel in the main carburetor shell 50 flows into the larger bore 98 of the block 89 through the axial and transverse bores of the plug 93 which controls the flow through the smaller bore 97 into the larger bore 98, it being here noted that interchangeable plugs 93 may be made with different sized axial and transverse bores and substituted one for another when it is desired to flow a greater or lesser amount of liquid fuel from the main carburetor shell 50 into the larger bore 98 of the block 89. So, too, instead of using the plugs of the type illustrated, an adjustable needle valve or the like may be obviously provided and substituted for controlling the liquid flow between the main carburetor shell 50 and the bore 98 of the block 89. This substitution being obvious, no detailed illustration or further description thereof is deemed necessary.

The block 89 is provided with a vertical bore 117 in parallel relation to the alined bores 97 and 98, the upper end portion of said bore 117 being enlarged, as at 118, and screw-threaded for the reception of a correspondingly threaded plug 119, said plug 119 having a needle valve extension 120 at its inner end which is adjusted to vary the degree of opening in the bore 117 at the base of the enlargement 118 thereof by the turning of the plug 119 and thereby moving it inwardly or outwardly in the enlargement 118 of the bore, as the case may be. To prevent accidental displacement of the plug 119, a spring 119', constantly under compression, is coiled about the plug between its headed outer end portion and the adjacent top face portion of the block 89. A lateral air inlet port 121 is provided in the block 89 in communication with the enlargement 118 of said bore 117. The upper portion of the bore 117 is communicably connected to the bore 98 by a lateral duct 122 which inclines downwardly from said bore 117 and intersects the parallel ver-

tical bore 98 just below the annular shoulder 102 of the needle valve element 99 and above the level of the liquid which enters the bore 98, it being here noted that the normal maximum level of the liquid fuel in the bore 98 is substantially the same as that of the liquid in the shells 50 and 51. This duct 122, as shown, is provided by boring the block 89 diagonally from the outside and intersecting the bore 117, the bore constituting the duct 122 being closed at its outer end by a plug 123.

Tapped into the lower end portion of the vertical bore 117 of the block 89, by a coupling nipple 124, is a depending pipe 125 whose lower end is tapped, by means of a coupling nipple 126, into the lower portion of the base member 1 of the suction column below the throttle valve 37. By this provision, when the throttle valve 37 is closed and the engine is running at idling speed, the suction created in the base member 1 in turn creates suction in the pipe 125, and, obviously, in the bore 117 and transverse passageway 122 between said bore 117 and the alined parallel bores 97 and 98, the liquid fuel in the bore 98 being drawn through the transverse passageway 122 into the bore 117. At the same time air is drawn into the bore 117 through the intake port 121, thereby producing a combustible mixture of ample richness for the operation of the engine at idling speed, such mixture being drawn into the base member 1 below the closed throttle valve 37. Obviously, the proper balance in the combustible mixture for idling operation of the engine is attained by providing a plug member 93 with properly proportioned axial and transverse passageways therein and by accordingly setting the needle valve point 120 which controls the air supply to the mixing chamber which is afforded by the bore 117 in the block 89 as hereinbefore described.

In order to gain access to the interior of the shells 50 and 51, the outer shell is provided with a conventional cover plate 127, which is secured at its marginal portions by screws 128 and with leaktight fit to inturned flanges 129 provided therefor on the longitudinal side and transverse end walls of the shell and surrounding the top opening of the shell. The inner shell 51 is provided with a similar cover plate 130. So, too, in order to prevent damage to the carburetor should a back fire occur, the cover plate 127 of the outer shell 50 is provided with an outwardly flanged relief opening 131. This relief opening is normally closed by a yieldable cover plate 132 provided with a sealing gasket 132', which marginally engages the flanged portion of the opening 131 when the cover plate 132 is yieldably held in its closed position by a spring element 133. As shown, the cover plate 132 is provided with an axial stem 134 which is slidable in an apertured guide member 135 extending diametrically across the relief opening 131, said stem having the head 136 at its lower end, between which and the guide member 135 the spring 133 is interposed and under constant compression so as to keep the cover plate 132 closed during normal operation of the carburetor.

By the provision of a carburetor of the general characteristic construction and arrangement herein illustrated and described, a properly balanced mixture of air and vaporized liquid fuel is obtained under all operating speeds and load conditions to which an internal combustion engine is subjected, particularly one installed on a motor vehicle, and the carburetor operating to ideal advantage in the upgrade travel of the vehicle. In this connection it is also noted that by having the peculiarly formed air intake ducts located adjacent the longitudinal side walls of the outer shell 50 of the carburetor, the vehicle may also tilt laterally at a considerable angle without detracting appreciably from the normal operation of the carburetor as when the vehicle is traveling in the general forward direction, either on a level roadway or upgrade as hereinbefore described.

While the construction and arrangement herein illustrated and described embodies a practical adaptation of the invention, it is obvious that considerable modification may be made in the general structure as well as in the particular parts thereof without departing from the spirit of the invention as defined in the appended claim.

The invention, therefore, is not limited to the specific construction and arrangement shown.

What is claimed is:

In a carburetor including a suction column carrying a superposed carbureting unit proper and adapted for communicable attachment to the fuel intake of an internal combustion engine or utility requiring a combustible mixture of air and vaporized fuel for its operation and by its operation creating the suction in the suction column, said suction column containing a throttle valve and being provided with a lateral air intake above the throttle valve and controlled by a capacity controlling valve, means for supplying a combustible mixture for operating the engine or utility to which the carburetor is applied at idling speed with the throttle valve closed and for starting purpose with the throttle valve open and the capacity controlling valve closed or nearly closed, said means comprising a unitary assembly including a body block attached to the carbureting unit proper and having a transverse bore communicable with the liquid fuel supply within the carburetor unit proper, means for restricting the flow of liquid through said transverse bore, a longitudinal bore in said block communicable with said transverse bore and provided with a self-closing valve yieldably held in normally closed position, interconnected means between said self-closing valve and the throttle valve and capacity controlling valve whereby said controlling valve is opened when the throttle valve is in closed position and when said capacity controlling valve is in closed or nearly closed position, a companion longitudinal bore in said body block, a pipe connection between said companion bore and the suction column below the throttle valve therein, a lateral passageway in said body block connecting said first-mentioned bore and companion bore therein, an air inlet port in said body block communicable with said companion bore therein, and a selectively adjustable valve element for controlling the supply of air to said companion bore from said inlet port.

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