

May 2, 1933.

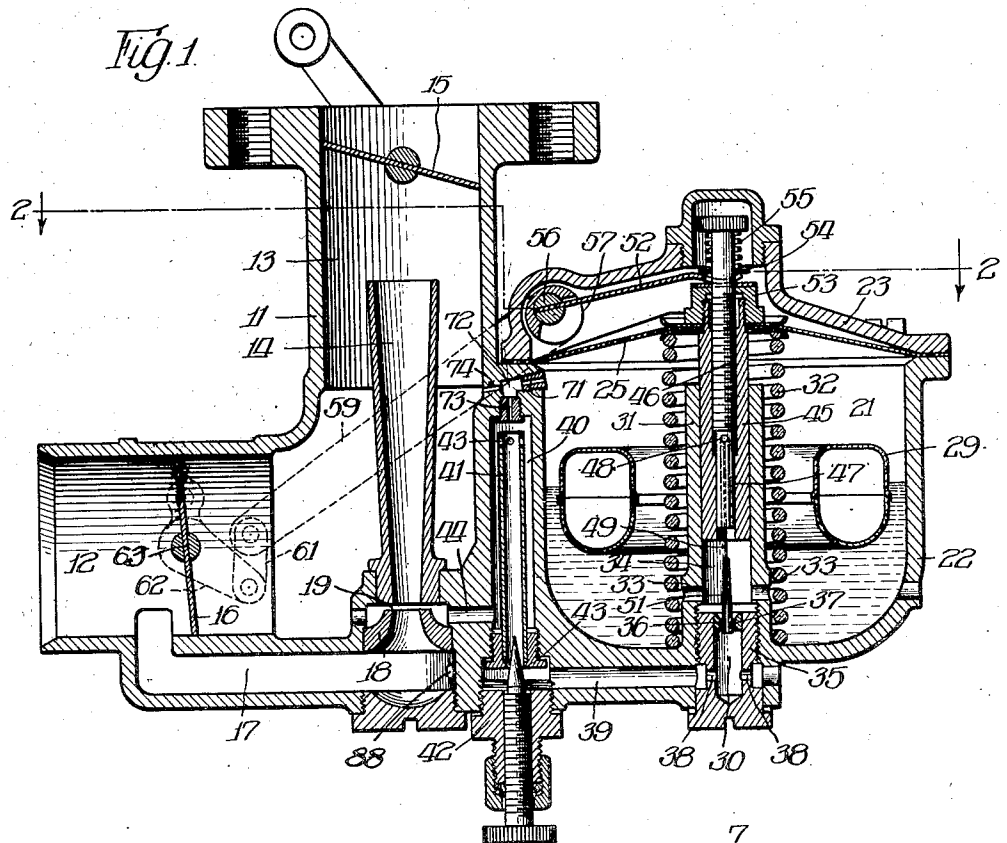
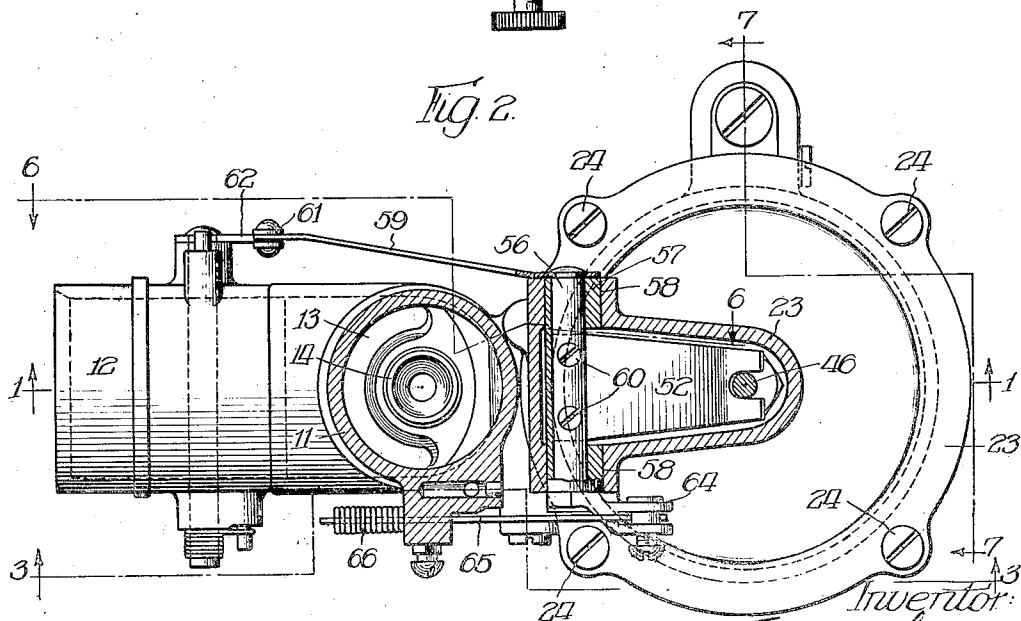
T. LINGA

CARBURETOR

1,906,982

Filed Oct. 8, 1930

3 Sheets-Sheet 1



Inventor:

By Walter M. Fuller atty.

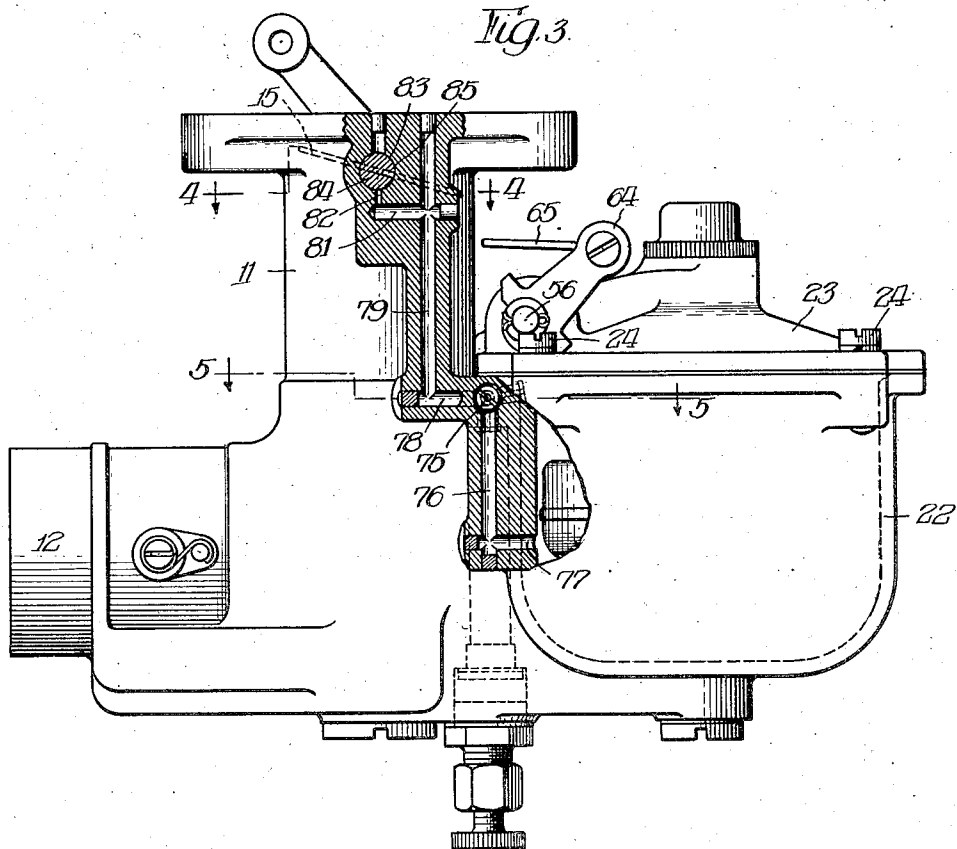
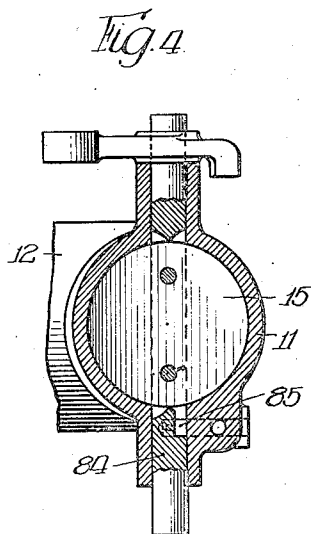
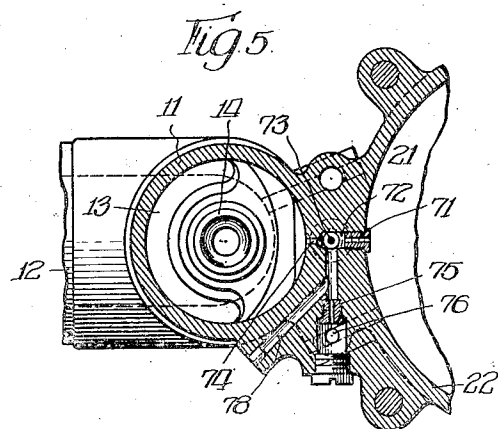
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T. LINGA
CARBURETOR

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 6.

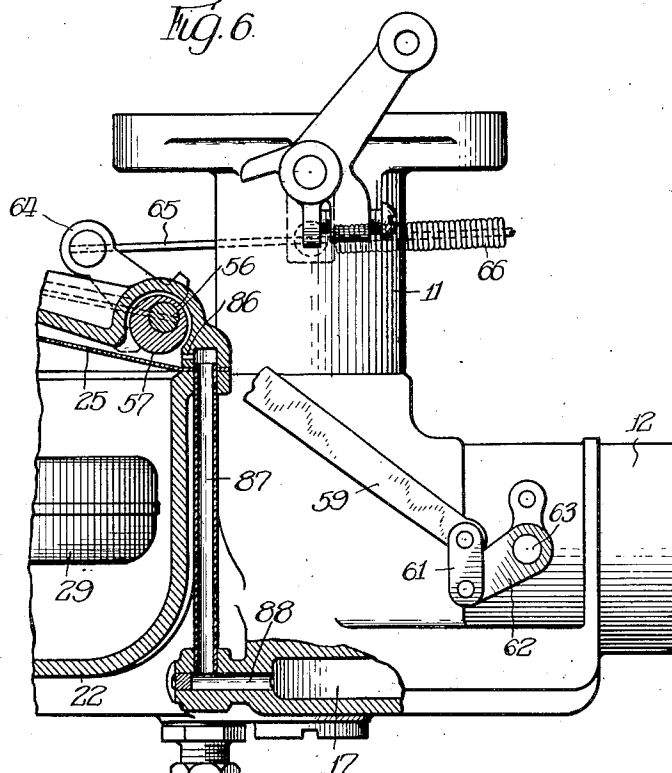
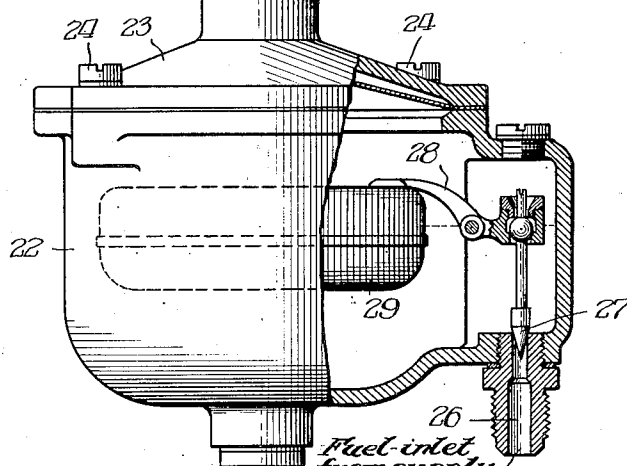


Fig. 7.



Fuel-inlet
from supply
at lower level

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UNITED STATES PATENT OFFICE

TORBJÖRN LINGA, OF KOKOMO, INDIANA

CARBURETOR

Application filed October 8, 1930. Serial No. 487,206.

One object of the present invention is to provide a practical carburetor of the so-called self-feed type for internal-combustion engines, which requires no separate vacuum-tank or pump to supply the carburetor with fuel.

That is to say, the new carburetor is capable of lifting or elevating liquid fuel from a supply located at a level lower than that of the carburetor, as from a supply-tank positioned at the rear of an automobile which is a common and usual construction at the present time.

A further aim of the invention is to supply a carburetor construction of this character, which, by a simple change or adjustment of a spring, may be regulated as to its fuel-lifting capacity to conform to the requirements of the particular installation, since it is not feasible or desirable to make a carburetor with a fuel-elevating power greatly in excess of that needed for the particular installation, as an increase in such lifting capacity necessitates an augmented depression or suction in the carburetor with a resulting loss of volumetric efficiency.

Another object of the invention is to produce a carburetor which has the lowest permissible suction or depression in its mixing-chamber in order to secure maximum power out of the associated engine, especially at high speeds.

Still a further purpose is to make such a construction with low suction and at the same time have adequate suction to lift the fuel the required height from the supply to the carburetor-bowl or fuel-reservoir.

Added purposes of the invention are to supply a carburetor with a relatively small restriction against inflowing air, with simple and efficient means for adjusting or controlling the fuel-air ratio for low, intermediate and high engine speeds, with effective and uncomplicated means for enriching the mixture, as well as increasing the air velocity through the venturi, during engine acceleration, with an economizer for automatically providing a leaner mixture at part-open throttle than with fully open throttle, and with means for enriching the mixture during the starting

of the engine and while it is warming up, the construction being such that all air entering the carburetor must pass through a single entry passage which may, if desired, be provided with an air-cleaner or filter.

To enable those acquainted with this art to understand the invention fully, both from structural and functional standpoints, in the accompanying drawings, forming a part of this specification, and to which reference should be had in connection with the following detailed description, a present, preferred embodiment of the invention has been shown in detail, and, for simplicity, like reference numerals have been employed to designate the same structural elements throughout the several views.

In these drawings:—

Figure 1 is a central, vertical, longitudinal section through the carburetor on line 1—1 of Figure 2;

Figure 2 is a horizontal section through the construction on line 2—2 of Figure 1;

Figure 3 is a fragmentary, vertical section on line 3—3 of Figure 2;

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

Figure 5 is a horizontal section on line 5—5 of Figure 3;

Figure 6 is a vertical section on line 6—6 of Figure 2; and

Figure 7 is a vertical section on line 7—7 of Figure 2.

Referring to these drawings, it will be readily perceived that the carburetor body, characterized as a whole 11, has an air entrance or intake opening 12 through which air may flow or be drawn into the main or mixing chamber 13 occupied in part by a Venturi-tube 14, the upper end of compartment 13 being fitted with the usual throttle-valve 15 and the opening 12 being equipped with an auxiliary-air or choke valve 16.

An air-passage 17 connects with the opening or conduit 12 outwardly beyond the auxiliary-air valve 16 and delivers its air into the lower, flaring end 18 of the Venturi construction, which, as is fully shown, is mounted in the lower wall of the carburetor and projects up into the chamber 13 with an an-

nular, intermediate opening or port 19 through which the fuel may be entrained or sucked into the Venturi appliance.

The float-chamber or fuel reservoir or compartment 21 of the carburetor is composed of a main body or bowl 22 and a top cap or closure 23 held thereon by screws 24, 24, the border of a flexible diaphragm 25, such as a cloth treated with linseed oil, which divides the interior of the compartment into two chambers, being clamped between the marginal flanges of the two co-operating elements 22 and 23.

Fuel is admitted into the bowl 22 through an inlet-pipe 26 connected to a lower fuel-supply tank, not shown, the infeed of such fuel being governed and regulated to maintain a constant fuel level in the bowl, by a valve 27, a lever 28 on which the valve is mounted, and a float 29 underlying the lever, all of which is of usual construction.

Internally, fuel-bowl 22 has a centrally-disposed, hollow bearing 31 upstanding from its bottom wall and around this is a coiled spring 32, as nearly as possible of equal strength throughout its working range, resting at its lower end on the floor of the bowl and pressing at its upper end against the underside of the diaphragm, holes 33 being provided through the lower part of the wall of member 31 to allow the passage of the fuel therethrough into the inner chamber 34, which, as explained below, forms part of a dash-pot structure.

A hollow plug 35 is screwed into the bottom wall of the bowl and the member 31, its upper, open end being equipped with a bushing or ring 36 having a central, calibrated opening or port 37 through it, the lower part of the plug having lateral openings 38 connecting its interior chamber 30 with a passage 39 communicating with the inside of the lower end of an upright tube 41 above a screw-threaded plug 42 screwed into the body of the carburetor, a manually-adjustable, metering needle-valve 43 co-operating with the aperture at the lower end of the tube and regulating the size of the free opening between passage 39 and the inside of the tube.

Such tube 41 is located in a larger, upright, cylindrical chamber 40 provided in the central part of the carburetor body, the top end of the tube being closed but with lateral openings 43 through its side walls just below the end closure.

As is clearly shown, the lower portion of chamber 40 is joined by a conduit 44 to passage 19 of the Venturi structure.

Tube 41 extends above the liquid level in reservoir 22 to prevent the drainage or siphoning off of its contents.

Fixed to the diaphragm and movable up and down therewith as the diaphragm flexes is a plunger 45 slidable in the interior of the bearing-member 31, the plunger or piston

constituting part of the dash-pot mechanism referred to above.

Such plunger has a centrally-arranged, screw-threaded opening accommodating a manually-adjustable threaded rod or screw 46 having a hollow, lower part 47 to which at 48 is fastened the upper end of a flexible wire 49, the space in the adjustment screw section 47 being large enough to permit flexure or side movement of the wire.

The lower end of such wire carries a tapered valve or calibrated metering element 51 occupying the port or opening 37, so that, as the diaphragm flexes, such element will open the port 37 more or less.

The rounded, split end of a lever-arm 52 is located between a nut 53, above the diaphragm and forming part of the means for fastening the sliding plunger to the diaphragm, and a disc 54 bearing on the top of the lever-arm and between which and the knurled head of the screw 46 a spring 55 is employed.

Such lever-arm 52 is fixedly mounted, as by screws 60, on a rock-shaft 56 capable of turning in a longitudinally-recessed, eccentric sleeve or bearing 57 having bearings 58, 58 in the walls of the carburetor.

One protruding end of shaft 56 has an arm 59 rigid therewith joined by a link 61 to an arm 62 fastened on the end of the shaft 63 of the auxiliary-air admission valve 16.

It will, therefore, be clear that as the diaphragm flexes up and down the auxiliary or choke valve 16 will be correspondingly rocked to open or close it more or less.

In order that the diaphragm may be allowed to bend in greater degree, as when starting the engine, before opening the auxiliary valve 16, the eccentric bearing or sleeve 57 may be turned to lower the position of the fulcrum shaft 56, and this is accomplished by means of an arm 64 on one end of the sleeve 57 to which a check or operating wire 65 is connected, the usual spring 66 being employed to restore the wire, arm, and sleeve to normal position as soon as released by the operator after the choking has been completed.

The fuel bowl or reservoir 21 is connected through a small hole 71 to a small chamber 72 which is in communication through a port 73 with chamber 40 and through another small orifice 74 with the carburetor mixing-chamber 13, such space 72 also connecting through a metered passage 75 (Figure 5) with a right-angle conduit 76, 77 leading down into the fuel-bowl below the fuel-level therein and with another passage 78, 79, 81, 82 leading to one of the bearings 83 for the shaft 84 of the throttle-valve 15.

Such shaft 84 is longitudinally slotted or recessed at 85 in such relation or position, that, when the throttle-valve is closed (see Figure 3), the ports of passages 82 and 85

are out of register, but when the throttle-valve is fully or almost fully open, these passages register and then chamber 72 is in communication with chamber 13 through the connecting conduits 78, 79, 81, 82, 83.

The compartment above the diaphragm 25, as is shown in Figure 6, is joined through a hole 86 and an upright tube 87 to a passage 88 connecting with the air conduit 17, whereby any air entering the compartment above the diaphragm is drawn through the opening 12, and, if the latter is provided with an air-cleaner or filter, all air entering the carburetor is filtered or freed from dust and the like.

The novel and improved carburetor functions substantially as follows:

When the engine with which the carburetor is associated is at rest, spring 32 maintains the diaphragm at its upper position of flexure, thereby closing the auxiliary air-admission valve 16 by reason of the specified mechanical connection between the diaphragm and the shaft of such valve through the co-operating parts 52, 56, 59, 61, 62, 63, and, under these circumstances, there is no open air entrance except through the relatively-small passage 17 leading to the venturi 18, 14.

When the operation of the engine is instituted, a depression or suction will be set up in mixing-chamber 13, causing a relatively high air velocity through the Venturi structure, and a much greater depression or suction will be produced in passages 44, 40, 41, 39, 38, and 30, due to the aspirating effect of the venturi.

In the present case, with a carefully made venturi, this relation is about 1 to $3\frac{1}{2}$ at medium engine demand, about 1 to 3 at maximum engine demand, and may exceed 1 to 4 at idling.

The reason for this variation is that the suction amplifying ability of the venturi decreases as greater quantities of liquid fuel flow into it.

It will be readily seen, however, that notwithstanding this variation in the suction-augmenting effect of the venturi due to the variation of the fuel flow, and notwithstanding that one venturi might differ somewhat from another venturi, due to a more or less exactness in their manufacture, the suction in the fuel-bowl 21 is always maintained constant to the same extent as the strength of the spring 32 is constant throughout its working range, and therefore a substantially constant predetermined suction is maintained in the fuel-bowl for lifting fuel from the lower level. The suction in the mixing chamber, however, will vary to the same extent as the suction-augmenting factor of the venturi varies and inversely therewith.

This depression or sub-atmospheric pressure condition is not only present in cham-

ber 30 and at its fuel-port 37, but it will also reach the upper part of the inside of the fuel-bowl 22 through the openings 73, 72, 71, yet, at this point, the depression or suction will be reduced by reason of the presence or action of the small bleeder-port 74, or, stated somewhat differently, the suction exerted at the port 37 will be sufficiently greater than that in the fuel-bowl above the liquid level, that a fuel flow will be brought about through the calibrated port or orifice 37 into the venturi and its proper mixture with the air.

During the operation of the engine, due to the depression created in the fuel cup or bowl 22, the diaphragm will be flexed downwardly against the action of spring 32, such bending of the diaphragm opening the auxiliary-air valve 16 more or less, and, obviously, there will be a balanced position of the parts for every throttle opening and engine speed.

It is to be understood that the suction in the fuel-bowl 22 is sufficient to lift the incoming fuel from the lower supply tank to keep the carburetor properly charged with fuel at the desired level.

The degree of sub-atmospheric condition in the fuel-bowl, therefore, depends upon the strength of spring 32 and by adjusting such spring, or by simply using a stronger or weaker one, the fuel lift capacity of the carburetor may be made to meet any particular requirement.

The construction of the carburetor is such, with respect to the structure, size, strength and association of its parts, that, by the automatic operation of the auxiliary air-admission valve, the suction in the fuel reservoir is maintained substantially unvarying, and the suction at the outlet of the reservoir is kept practically constant, except that the latter suction is increased during engine acceleration and during full or nearly-full open throttle position.

I have, therefore, provided a carburetor having sufficient suction to lift the fuel into the reservoir and at the same time having a relatively-small depression in the mixing-chamber which assures a maximum of power from the engine.

Were a spring acting on the diaphragm selected which provided a depression in the fuel cup or bowl corresponding to a column of 40 inches of water and a depression in the carburetor mixing-chamber 13 of 14 inches, the corresponding condition in chamber 30 would be 48 inches.

The situation may be explained as follows: The depression or suction at the top of the venturi in chamber 13 is 14 inches, and if the opening 74 were closed, the depression in both the fuel-reservoir 21 and chamber 30 would be 49 inches ($14 \times 3\frac{1}{2}$) assuming a venturi efficiency of $3\frac{1}{2}$.

Passage 74 being open, however, a small stream of air flows in through it from chamber 13 and down through opening 73 and on into the venturi at 19.

To start with, this air was under a depression of 14 inches, but its passage through the small orifice 74 causes a further drop of 26 inches giving a depression of 40 inches in chamber 72 and in the fuel-reservoir 21.

The air in passing through the larger port 73 undergoes another pressure reduction of 8 inches, making the depression in 40, 41, 39, 38, 30,—48 inches, and, finally, there is an additional small pressure drop of about one inch, caused by the air passing through the opening 19 into the venturi, which balances the system, thus accounting for the full 49 inches.

There is now provided a depression of 40 inches in the fuel-bowl 21 and of 48 inches in chamber 30, affording a head of 8 inches for establishing and maintaining the fuel flow into the venturi.

This 8 inch head is practically constant or unvarying throughout the range of action of the carburetor, except during acceleration and fully open throttle, and accordingly, it becomes necessary to provide a variable fuel opening, that is, a metering device which will automatically enlarge or increase the free opening of the fuel orifice, which function is performed by the diaphragm-actuated, tapered, metering pin or valve 51.

At its lower, larger end such pin or valve 51 is just enough smaller than the orifice 37 to slip through it, and the fuel-feed adjustment for engine idling is effected by raising or lowering the tapered pin by manipulation of its adjustment screw 46.

Any irregularities in the parts are compensated for by the capacity of the pin to shift sidewise by reason of its flexible mounting on the small wire.

As the throttle-valve is opened, the diaphragm will flex downwardly, carrying the tapered pin with it, thereby increasing the opening at orifice 37.

There would be no difficulty in calibrating such tapered metering pin or valve to give a uniform or unvarying gaseous mixture throughout the whole range of operation, but it has been found to be more practical and satisfactory to calibrate the metering pin to produce a progressively richer mixture as it descends, for example, 10% over rich at the highest speed, which can be reduced to proper and correct leanness by the manually-adjustable needle-valve 43, which will affect the richness of the high speed mixture without having any considerable or material effect on the fuel-air ratio of the idling mixture because the free opening around such high speed needle 43 is very large.

An enriched mixture for starting the engine, and during its warming up period, is

provided by the operator pulling the arm 64 forwardly by means of the rod or wire 65, that is toward the air-intake end of the carburetor, which operation lowers the center of shaft 56 and changes the relative position of the auxiliary air-valve 16 and the metering pin or valve 51, the latter being lowered by such operation.

An internal-combustion engine requires a rich mixture for quick and positive acceleration and it also needs sufficient air velocity through the venturi or mixing-chamber to atomize or break up the fuel properly, and, in this new construction, these results are obtained as follows:

When the throttle-valve is quickly opened, the diaphragm 25 will move downwardly, but to allow this action, some of the air between the diaphragm and the surface of the fuel in the bowl or reservoir must escape.

The calibrated orifice 71 will retard such air discharge, because it is very small, and, consequently, the air pressure under the diaphragm cannot immediately equalize itself with the pressure in the small chamber 72, with the result that the pressure will be somewhat higher in the fuel-bowl, and this relative increase of pressure will force fuel out through passage 77 up conduit 76, through the calibrated orifice 75 into chamber 72, and from there it will pass through opening 73 into the main fuel passage or conduit 40 and 44.

This temporarily-supplied, supplemental fuel will provide the required mixture enrichment for acceleration.

Such downward movement of the diaphragm will, as explained, be retarded, and, as a result, the opening of the auxiliary air-valve 16 will be correspondingly delayed, thereby effecting a momentary increased suction or depression in the carburetor and an augmented air velocity through the venturi.

The downward travel of the pilot or plunger 45 will also have a slight retarding effect, due to the dash-pot action, as well as a slight direct effect in enriching the mixture.

During deceleration the diaphragm will move upwardly and air will be supplied to the space beneath it through the orifices 71 and 75, 77, thus allowing the diaphragm to flex upwardly more freely than downwardly.

A fuel mixture 20 to 24% leaner than the maximum torque mixture is the most economical to employ, and, therefore, a carburetor should have automatic means for changing the mixture ratio between partly-open and fully-open throttle-valve.

If the operator opens the throttle-valve completely, it signifies that he wishes all the power that the engine is capable of producing, and, in such a case, economy is a secondary and insignificant consideration.

When, however, the operator partly closes the throttle, it is evident that he does not re-

quire the full power of the engine, and, in that instance, economy becomes of prime value.

A practical and economical carburetor should have automatic means to effect a mixture ratio change as the throttle-valve moves from about 7/8ths open to fully open position.

This is accomplished in this new carburetor in the following manner:

If the orifice 74 were made larger, the difference of depression or suction in the fuel-reservoir 21 and at its outlet 30 would be greater, that is to say, the suction at such outlet would be augmented, and there would accordingly be an increased flow of fuel through the port or discharge opening 37.

Instead of varying the size of such aperture 74 to produce such a result, an additional passage is used to connect the chamber 72 to the main-chamber 13 of the carburetor, and this supplemental passage is opened and closed by the movement of the throttle-valve.

During the last eighth of the opening movement of the throttle-valve the chamber 72 is additionally connected to the main chamber 13 through the then connected passages 78, 79, 81, 82 and 85, thus effecting a richer mixture to assure full power of which the engine is capable.

For all other positions of the throttle-valve this supplementary or auxiliary connection is closed.

It will be noted that the carburetor has but a single air entrance 12, and, therefore, all air which enters it must pass through such opening, which, if desired, may be provided with an air cleaner or strainer, and, in this connection, it will be observed that the air which enters the conduit 17, that which passes by the auxiliary air-valve 16, and that which enters the space of the carburetor fuel-bowl above the diaphragm, all flows in through the single opening 12, and, therefore, is filtered or cleaned if the latter is provided with an appliance for that purpose.

Passage 17 is made large in cross-section relatively to the smallest diameter of the interior of the venturi to assure adequate air velocity through the venturi with consequent full aspiration and to reduce the depression to a minimum in passage 17 to provide proper pressure conditions in the fuel-bowl above the diaphragm with which the conduit 17 is directly connected through passage 86, 87, 88.

A continuous flow of air occurs through the orifice 74 from the mixing-chamber 13 into cavity 72 and then down through the aperture 73 into the fuel conduit 40.

By this construction the diminution of the suction exerted in the fuel reservoir is brought about outside of such reservoir and communicated to its interior through the hole 71.

Inasmuch as little of such air flowing

through orifice 74 enters the fuel-reservoir, any dust which it may carry along with it can in no way find entrance into the reservoir with resulting objectionable clogging effects.

Under extreme conditions, it may be desirable temporarily, or perhaps momentarily, to rock the eccentric sleeve 57 sufficiently so that one of its shoulders will engage the underside of the lever arm 52 and prevent the descent of the latter, but, even under such circumstances, the diaphragm and the valve 51 which it carries can descend under the action of the suction by reason of the presence of spring 55 between the top of the arm and the head of the adjustment screw 46.

In such a case, the diaphragm could not open the auxiliary air-valve until the sleeve 57 were rocked back from such extreme position.

Those skilled in this art will readily understand that many minor mechanical changes may be incorporated in the structure illustrated and described without departure from the heart and essence of the invention and without the sacrifice of any of its substantial benefits and advantages.

I claim:

1. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, means to permit auxiliary air to flow through the carburetor, an air-valve controlling the admission of such auxiliary air, and means governing said auxiliary air-valve and maintaining the respective suction in said fuel reservoir and said reservoir outlet substantially unvarying.

2. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to

maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, means to permit auxiliary air to flow through the carburetor, an air-valve controlling the admission of such auxiliary air, and means governing said auxiliary air-valve and maintaining the respective suctions in said fuel reservoir and said conduit substantially unvarying, the carburetor having a single air-entrance through which both specified air supplies flow.

3. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, means to permit auxiliary air to flow through the carburetor, an air-valve controlling the admission of such auxiliary air, and means acted upon by the suction in said reservoir controlling said auxiliary air-valve to maintain the increased suction in said reservoir substantially uniform.

4. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel

to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, means to admit auxiliary air into the carburetor, an air-valve controlling the admission of such auxiliary air, means governing said auxiliary air-valve and maintaining the respective suctions in said reservoir and in said conduit substantially uniform, a valve controlling the delivery of fuel through said reservoir-outlet, and means acted upon by the suction in said reservoir controlling the operation of said fuel-delivery valve.

5. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, a manually-adjustable needle-valve in said conduit, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, a valve controlling the delivery of fuel through said reservoir-outlet, and means acted upon by suction in the carburetor controlling the operation of said delivery-valve.

6. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, a manually-adjustable needle-valve in said conduit, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, a valve controlling the delivery of fuel through said reservoir-outlet, and means acted upon by the suction in said reservoir controlling the operation of said delivery-valve.

7. In a carburetor adapted for use with an internal-combustion engine, the combination of a mixing-chamber adapted to be subjected to the suction of the engine, an air and fuel
 5 mixing structure associated with said chamber, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected
 10 by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain a substantially constant fuel-level in said reservoir, the carburetor having a passage connecting
 15 said conduit with the interior of said reservoir both above and below the liquid-level therein and a bleeder-port for said passage, whereby a suction, less than that at the reservoir-outlet, prevails in said reservoir to
 20 lift the fuel into said reservoir from said supply at the same time permitting delivery of the fuel through said outlet by reason of the suction difference in, and at the outlet of, said reservoir, a valve controlling the outlet
 25 of said reservoir, and means to operate said valve including a diaphragm in said fuel-reservoir and adapted to flex under the action of the reservoir suction, whereby under
 30 certain conditions fuel may be forced out of said reservoir through said passage into said conduit to temporarily enrich the fuel mixture.

8. In a carburetor adapted for use with an internal-combustion engine, the combination
 35 of a mixing-chamber adapted to be subjected to the suction of the engine, an air and fuel mixing structure associated with said chamber, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet,
 40 a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain a substantially
 45 constant fuel-level in said reservoir, the carburetor having a passage connecting said conduit with the interior of said reservoir and a bleeder-port means for said passage, whereby a suction, less than that at the reservoir-outlet, prevails in said reservoir, to lift
 50 the fuel into said reservoir from said supply at the same time permitting delivery of the fuel through said outlet by reason of the suction difference in, and at the outlet of, said reservoir, a throttle-valve for the carburetor,
 55 and means directly connected to, and depending solely upon a definite position of said throttle valve and operated during the latter range only of the opening movement of said throttle-valve to vary said bleeder-port
 60 means to enrich the fuel mixture.

9. In a carburetor adapted for use with an internal-combustion engine, the combination
 65 of a mixing-chamber adapted to be subjected to the suction of the engine, an air and fuel

mixing structure associated with said chamber, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected
 70 by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain a substantially constant fuel-level in said reservoir, the carburetor having a passage connecting
 75 said conduit with the interior of said reservoir and a normally open and a normally closed bleeder-port connecting said passage with said mixing-chamber, whereby a suction, less than that at the reservoir-outlet,
 80 prevails in said reservoir to lift the fuel into said reservoir from said supply at the same time permitting delivery of the fuel through said outlet by reason of the suction difference in, and at the outlet of, said reservoir, a throttle-valve for the carburetor, and means
 85 operated during the latter range of the opening movement of said throttle-valve opening said normally closed bleeder-port to enrich the fuel mixture.

10. In a carburetor adapted for use with an internal-combustion engine, the combination of a mixing-chamber adapted to be subjected to the suction of the engine, an air and fuel mixing structure in said chamber, means
 95 to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet
 100 of the latter, means to maintain a substantially constant fuel-level in said reservoir, the carburetor having a passage connecting said conduit with the interior of said reservoir and a bleeder-port connecting said passage with said mixing-chamber, whereby a suction,
 105 less than that at the reservoir-outlet, prevails in said reservoir to lift the fuel into said reservoir from said supply at the same time permitting delivery of the fuel through said outlet by reason of the suction difference in, and at the outlet of, said reservoir, a valve
 110 controlling said reservoir-outlet, and means to operate said valve including a diaphragm in said reservoir above its fuel and adapted to flex under the action of the reservoir suction, the carburetor having an air vent connecting the space in said reservoir above said
 115 diaphragm with said air admission means.

11. A carburetor having a single air-entrance adapted for use with an internal-combustion engine, containing in combination a mixing-chamber adapted to be subjected to
 125 the suction of the engine, an air and fuel mixing structure associated with said chamber, means to admit air from said entrance to said structure, means to admit auxiliary air from said entrance to said chamber, a valve controlling the admission of such auxiliary air,
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a fuel reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey
 5 fuel from a supply lower than said reservoir to the inlet thereof, means to maintain a substantially constant fuel-level in said reservoir, the carburetor having a passage connecting said conduit with the interior of the
 10 reservoir and a bleeder-port connecting said passage with a source of pressure greater than that therein, whereby a suction, less than that at the reservoir-outlet, prevails in said reservoir to lift the fuel thereinto from
 15 said supply at the same time permitting delivery of the fuel through said outlet by reason of the suction difference in, and at the outlet of, said reservoir, and means to operate
 20 said auxiliary air-valve including a diaphragm in said reservoir above the fuel therein and adapted to flex under the action of the reservoir suction, the carburetor having an air vent connecting said air-entrance with the space above said diaphragm.

12. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to
 25 said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said
 30 reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter,
 35 means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby
 40 to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, a valve controlling the delivery of fuel through
 45 said reservoir-outlet, and means acted upon by the suction in said reservoir controlling the operation of said valve, said fuel delivery valve having a flexible connection with
 50 said controlling means.

13. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by
 55 the carburetor suction, means to admit air to said structure, a fuel-reservoir having an inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure,
 60 means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in
 65 lesser degree than that applied to the reservoir-

outlet through said conduit, whereby to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, means to admit auxiliary air into the carburetor, an air-valve controlling the admission of such auxiliary air, a valve controlling the delivery of fuel through said reservoir-outlet, means acted upon by the suction in said reservoir governing said auxiliary air-valve, controlling the operation of said fuel delivery valve, and maintaining the specified
 70 suction substantially uniform, and means to vary the relation between said auxiliary air-valve and said fuel delivery valve to permit an enriched mixture.

14. In a carburetor for use with an internal-combustion engine, the combination of an air and fuel mixing structure acted upon by the carburetor suction, means to admit air to said structure, a fuel-reservoir having an
 85 inlet and an outlet, a conduit connecting said reservoir-outlet to, and subjected to an increased suction effected by, said structure, means to convey fuel from a supply lower than said reservoir to the inlet of the latter, means to maintain the fuel-level in said reservoir substantially constant, means to apply suction to the interior of said reservoir in lesser degree than that applied to the reservoir-outlet through said conduit, whereby
 90 to lift the fuel from said supply into said reservoir by the suction therein at the same time permitting the delivery of the reservoir fuel to said mixing structure through said conduit by reason of the specified suction difference in, and at the outlet of, said reservoir, a diaphragm in said reservoir acted upon by the suction therein, a spring opposing flexure of the diaphragm in response to such suction action, a valve controlling the delivery of fuel through said reservoir-outlet,
 95 and a dash-pot construction retarding the flexure of said diaphragm.

In witness whereof I have hereunto set my hand.

TORBJÖRN LINGA.

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