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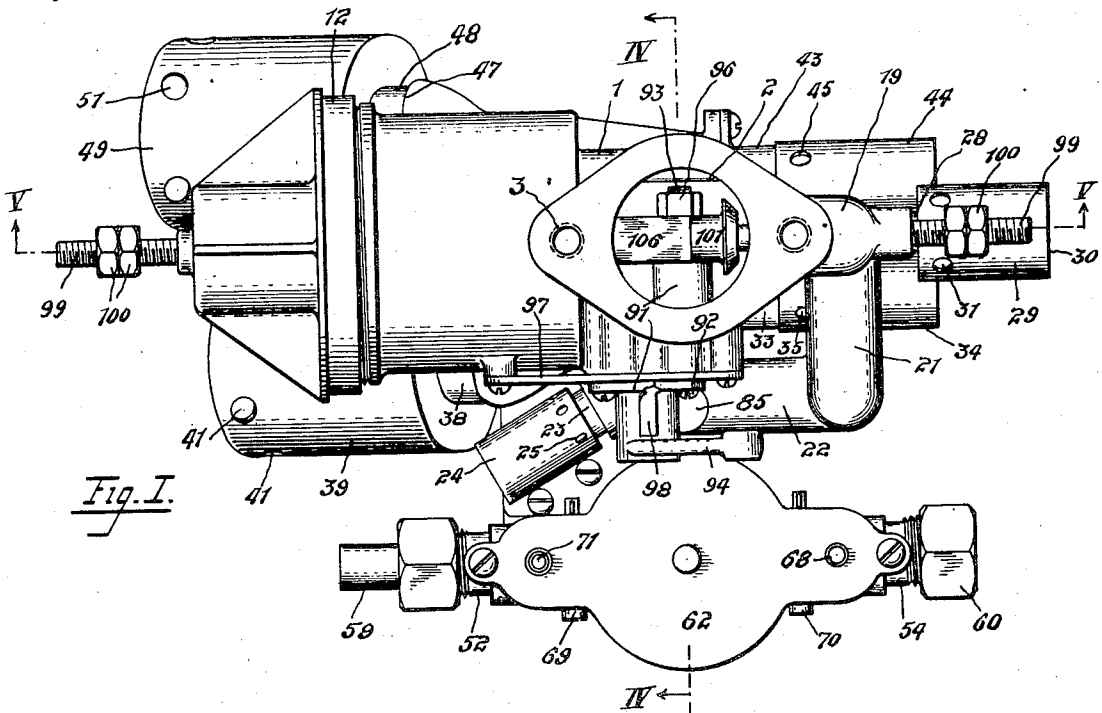


Fig. I.

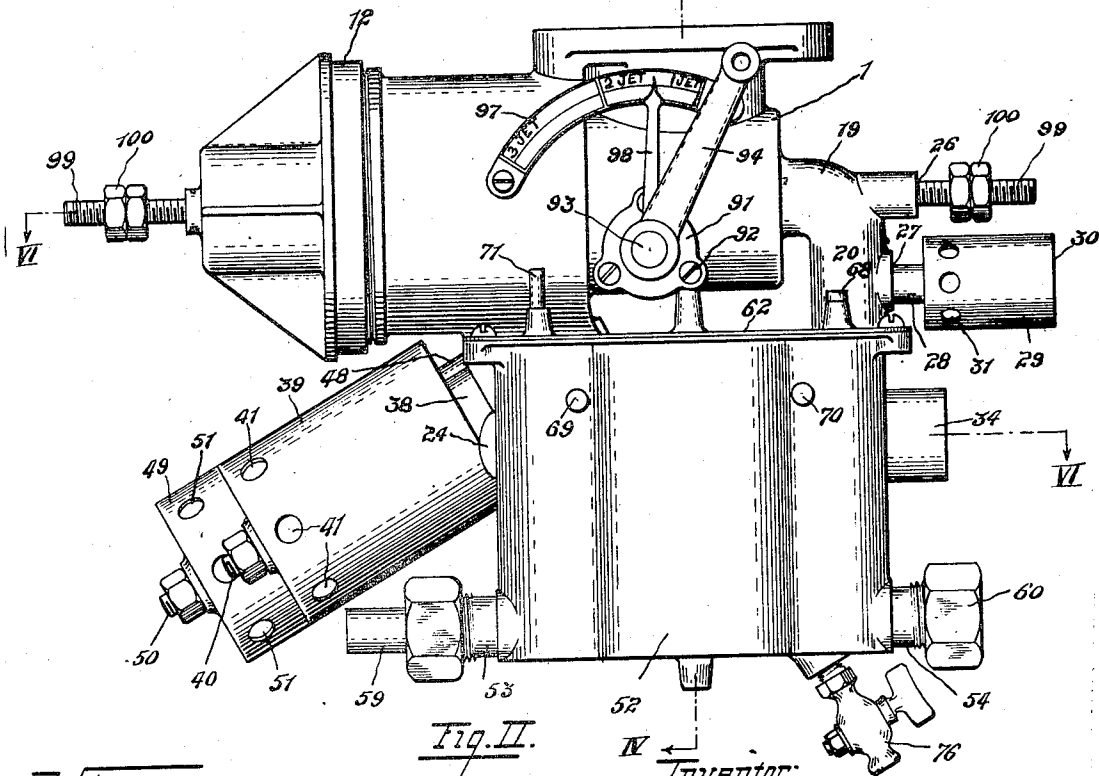


Fig. II.

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Inventor:

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by his atty

Curt R. Mueller

Patented Dec. 2, 1919.

4 SHEETS—SHEET 2.

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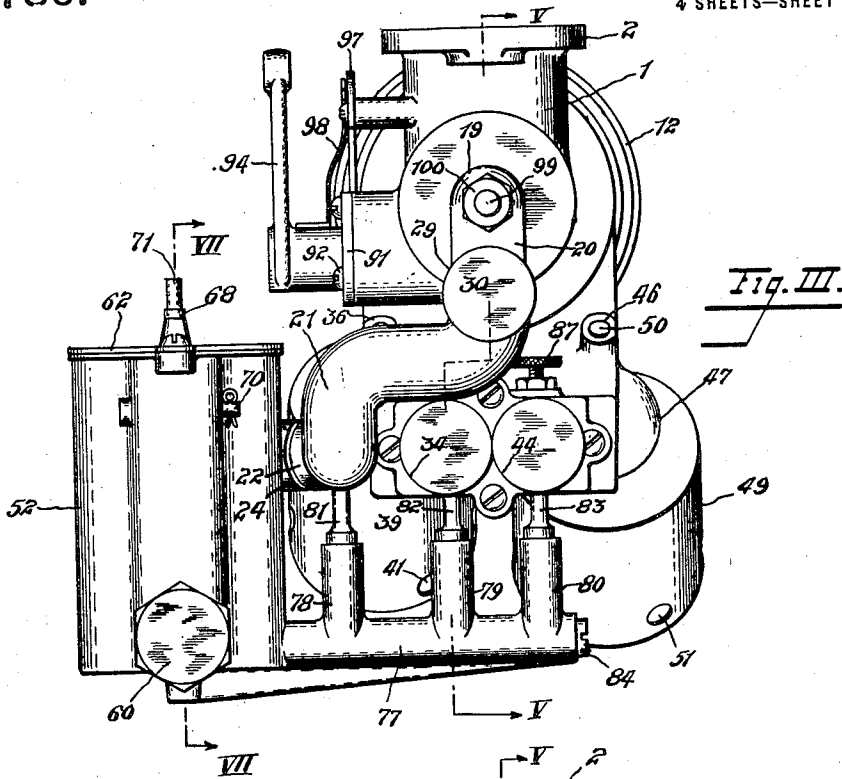


Fig. III.

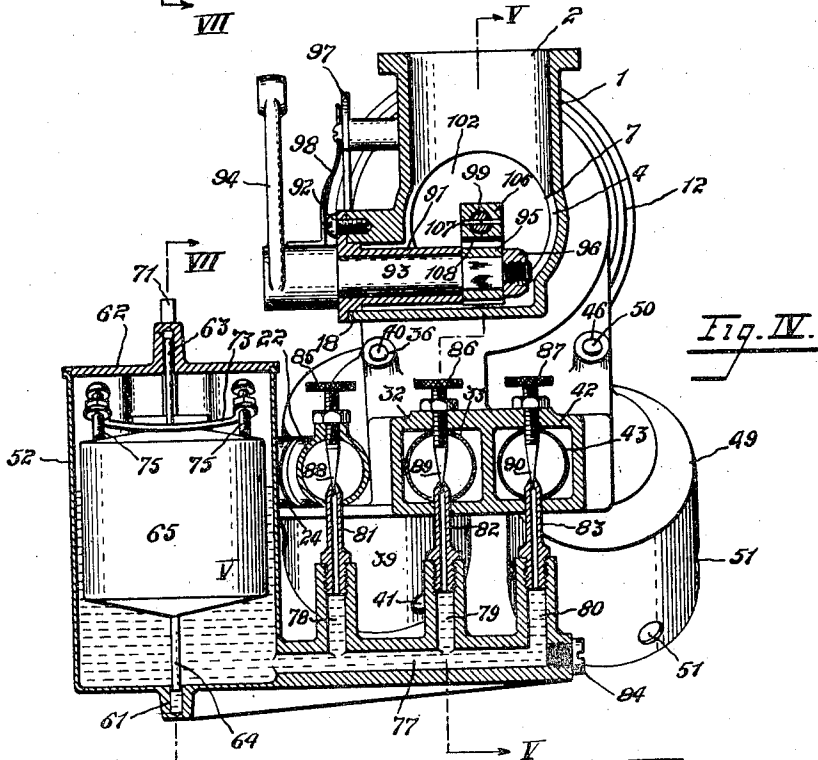


Fig. IV.

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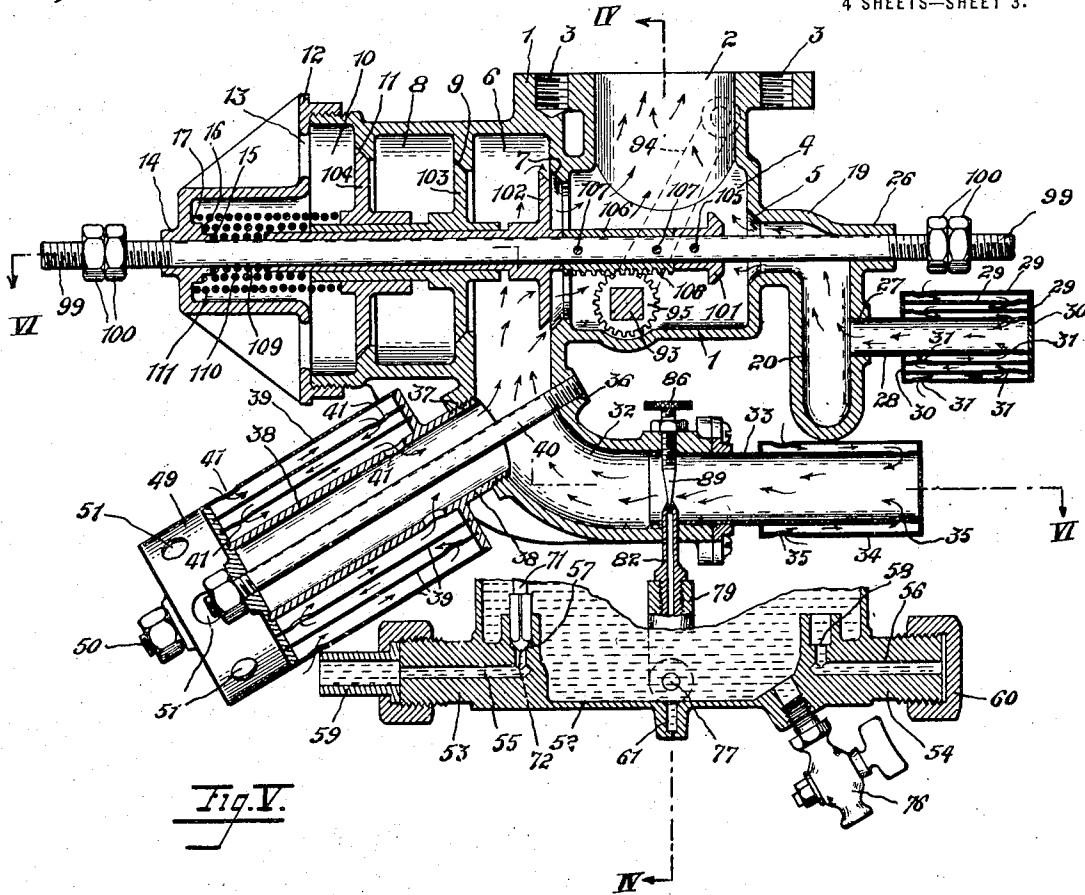


Fig. V.

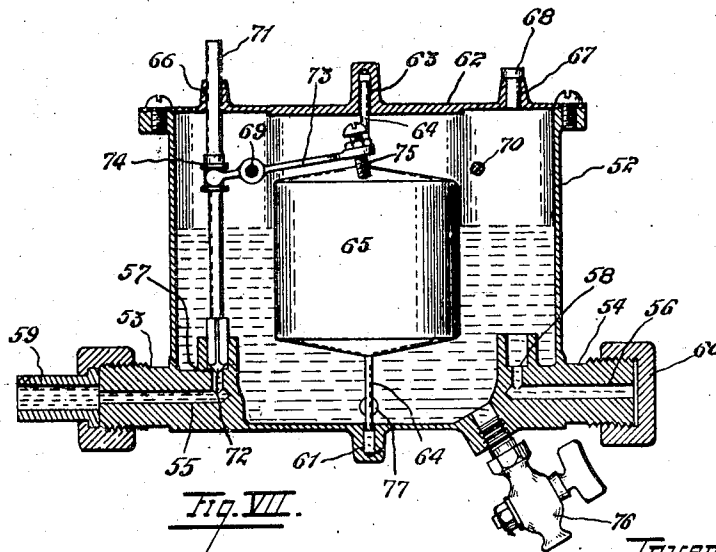


Fig. VII.

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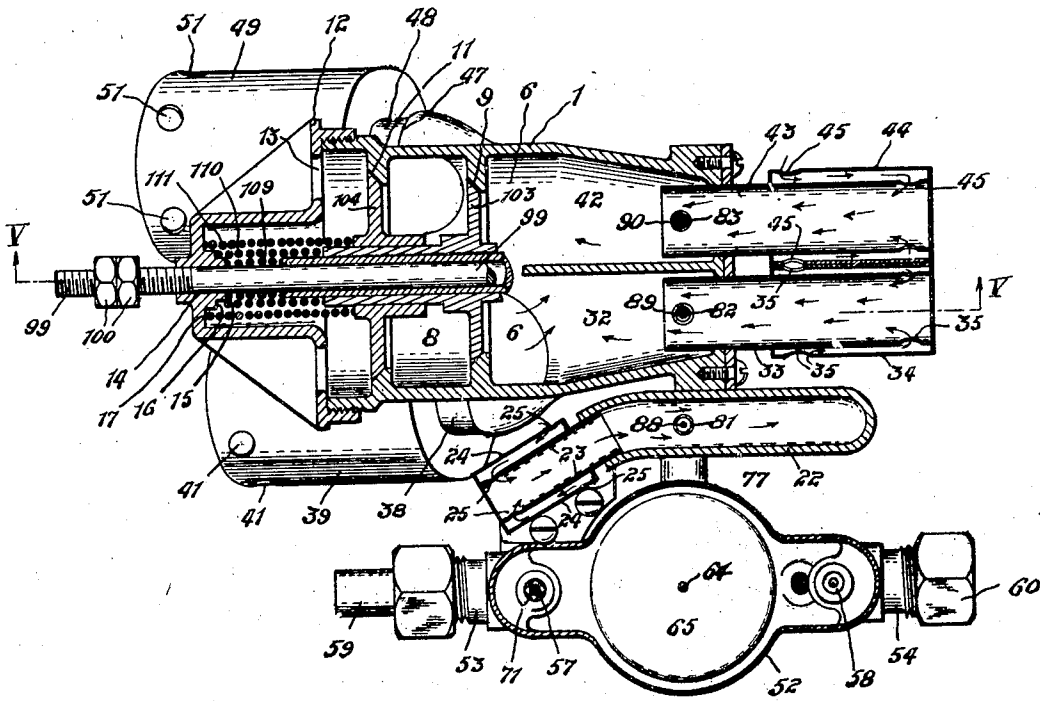


Fig. VI.

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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,323,786.

Specification of Letters Patent.

Patented Dec. 2, 1919.

Application filed April 24, 1916. Serial No. 93,111.

To all whom it may concern:

Be it known that I, FRANÇOIS RICHARD, a citizen of the French Republic, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Carbureters, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

This invention appertains to carbureters and more particularly to carbureters embodying the multiple jet principle.

The general object of the invention is to furnish a control whereby the proportion of fuel and air which are to affect the carbureted mixture may be regulated in a simple manner for all conditions, such as variable temperature altitude and varying speeds. A further object is the provision of a structure which is positive and efficient in operation and of durable and economical manufacture.

My invention proposes to dispense with all mechanical devices which are adapted to be actuated by the suction of a carbureter. To maintain the same proportion in carbureted mixture regardless of the weight of the carbureting elements, I have contrived an air resistance which allows the air to commingle with the gasoline, according to proper requirements. Certain air inlets are absolutely free at low speed and the resistance increases in proportion to the speed of the engine. I provide one air resistance chamber with which the fuel jets communicate, and another air resistance chamber is employed to decrease the velocity of the air from the first air resistance chamber. As the correct proportion for the entire volume of the air and gasoline will be too difficult to obtain otherwise, I divide the quantity into three parts which operate on the same principle namely, with one primary air resistance and one auxiliary air resistance.

The most important feature of my carbureter is that the engine does not do any work in the control of the carbureting function. The engine does not open any valves nor does the vacuum of the engine work against any spring. The vacuum is perfectly free from any mechanical duty but is

always under the control of the driver as illustrated in the drawings, or under the control of a suitably connected governor.

When the engine is at low speed with full volume of the carbureter there is a greater percentage of gasoline due to the fact that the vacuum at that time is low. When the engine is at full speed and again with full volume of the carbureter, the vacuum is too high and needs more air to decrease the suction upon the gasoline. To avoid this trouble I have provided a substantially unobstructed air port to give more air when the engine is at full speed so as to decrease the suction in that air chamber which is in communication with the source of gasoline. These air ports are however operated independently of suction instead of automatically in response to the strength of the suction effect.

Adverting to the drawings:

Figure I is a top plan view of a carbureter embodying my invention.

Fig. II is a side elevation of the same.

Fig. III is an elevation of that end of the carbureter which will hereinafter be considered as the front.

Fig. IV is a vertical cross section on line IV—IV of Fig. I looking in the direction of the arrows.

Fig. V is a vertical section from front to rear taken on line V—V of Fig. III and similarly looking as directed by the arrows, and also showing a broken section of one specific accessory.

Fig. VI is a horizontal section along the zig-zag line VI—VI of Fig. II.

Fig. VII is a vertical section of the float chamber.

General statement.

The drawings as seen in Fig. IV illustrate a carbureter provided with a triple series of spray nozzles or fuel jets any one or all which are adapted to functionate in a usual manner depending upon the discretion of the operator, and each of the three is provided with a primary and an auxiliary air inlet, as it happens, one ahead and one behind the same with reference to the direction prescribed on toward the mixing chamber. Each of the three independent sources of fuel supply is afforded communication with

a common mixing chamber through its own particular valve, all of which are normally held closed and adapted to be opened successively. Other features, of my arrangement which appear will be hereinafter explained in the order in which the function of each is likely to be best understood.

Main arrangement.

10 Directing attention next to Fig. V, a casing 1 of irregular shape and in part integral and in part assembled according to the dictates of manufacturing expediency, shows a main flanged outlet 2 leading to the engine
15 and provided with threaded openings 3 to permit of a connection therewith. Immediately adjoining the outlet 2 is a mixing chamber 4 having an inlet 5 fashioned as a valve seat and hereinafter referred to as the
20 first inlet for the carbureted mixture, because it is in connection with that one of the sources of fuel which is always utilized first. The casing 1 is also built with a series of compartments and in this instance to the
25 number of three adjoining the mixing chamber 4. That one of the compartments which is nearest the mixing chamber 4 is designated as 6 and is likewise in communication therewith on the side opposite to that in
30 which the first inlet opens through an opening 7 similarly fashioned as a valve seat. This compartment 6 is designed to have direct communication with the second source of fuel supply and accordingly the opening
35 7 may be hereinafter logically referred to as the second inlet. The next compartment 8 or the one which immediately adjoins the compartment 6 is adapted to be placed in communication therewith through an opening
40 9 which is also fashioned as a valve seat as may be observed upon inspection of either Fig. V or Fig. VI. The compartment 8 is in communication with the third source of fuel supply in a manner identical with that
45 which is illustrated in Fig. V whereby is shown the complete route of travel between the second source of fuel and the mixing chamber 4 and accordingly such compartment 8 may be termed the third inlet. Still
50 another compartment 10 will be noticed in either Figs. V or VI to be afforded communication with the compartment 8 through an opening 11 which is similarly fashioned as a valve seat. The end of the casing 1 at
55 which the compartment 10 is located is fashioned with a screw threaded connection and cap 12 having the openings 13 which cause the compartment 10 to communicate directly with the atmosphere. The cap 12 as clearly
60 appears in Fig. V is hollowed interiorly about its center and is provided with a bearing 14. Such hollowed interior is moreover shaped to form three annular surfaces 15, 16, 17 which are disposed different distances
65 outwardly from the bearing 14. Looking

next to Fig. IV the upper part of the casing 1 will be seen provided at one side with an opening 18 in communication at the bottom of the mixing chamber 4 for a purpose to be later explained.

Initial fuel conduit.

A bent tube connects integrally or otherwise with the first inlet at 5 and comprises a forwardly projecting portion 19, a downwardly extending portion 20 both best seen
75 in Fig. V, an intermediary right angular portion 21 as may be seen in Fig. III and a rearwardly extending horizontal portion 22 to be seen in Figs. I and VI. The rear end of the portion 22, as is apparent in Fig. VI,
80 connects with a device through which air is compelled to pass along a sinuous route affected by a pair of concentric tubes 23 and 24 closed except for ports 25 located at opposite ends thereof respectively. By means
85 of such a construction the influx of primary air may be to a certain extent controlled and stabilized regardless of prevailing conditions. Extending in a longitudinal direction through the portion 19 so as to be alined
90 concentrically with the several valve seats 5, 7, 9, and 11 respectively and also with the bearing 14 is another bearing 26 which coincides in dimension with the bearing 14.
95 The downwardly extended portion 20 of the bent tube connecting the first source of fuel with the first inlet has an opening 27 in which another device for controlling the auxiliary air supply in a manner similar to the one which was first described is situated.
100 The construction of this auxiliary air control for the first inlet clearly appears in Fig. V and involves an inserted tube 28 and three other concentrically spaced tubes 29 which are closed at each end 30 and provided therearound and at alternate ends with
105 ports 31. It will suffice to state here that fuel from the first source is supplied between the points of entry of the primary air and auxiliary air to the bent tube under consideration.

Second fuel conduit.

Connecting from below with the compartment 6 is a forwardly extending tube 32 into the open end of which a control device similar to those already mentioned is inserted.
115 Such device will be noticed in Fig. V to comprise the tubes 33 and 34 closed but for the ports 35 at alternately opposite ends therein. This particular device constitutes the initial source of air supply for mixing with the fuel issuing from the second source.
120 The tube 32 will be seen to include a boss having a diagonally extending screw threaded opening 36 and opposite thereto another boss having a larger screw threaded opening 37. The opening 37 is adapted to support the auxiliary air controlled device
125 130

which includes an inner tube 38 and three concentrically spaced tubes 39 effecting a closure near one end with a flange upon the former and at the other end by means of a cap held in place by a rod 40 secured in the opening 36. The tubes 38 and 39 are likewise fashioned at alternately opposite ends with ports all designated as 41.

Third fuel conduit.

As has been stated before, the so called third fuel conduit is identically shaped and similarly connected, though differently located, as the second fuel conduit which has just been described. Accordingly it is not completely illustrated though its relationship may be sufficiently understood from an inspection of Figs. V and VI. Such conduit includes a tube 42 in communication from below with the compartment 8 and projecting into the open end of said tube is a control device similar to those already mentioned. Such device will be noticed in Fig. VI to comprise the tubes 43 and 44 closed but for the ports 45 at alternately opposite ends therein. This particular device constitutes the initial source of air supply for mixing with the fuel issuing from the third source.

The tube 42 should be presumed to include a boss having a diagonally extending screw threaded opening 46 and opposite thereto another boss having a larger screw threaded opening 47. The opening 47 is adapted to support the auxiliary air controlled device which includes an inner tube 48 and three concentrically spaced tubes 49 effecting a closure near one end with a flange upon the former and at the other end by means of a cap held in place by a rod 50 secured in the opening 46. The tubes 48 and 49 are likewise fashioned at alternately opposite ends with ports all designated as 51.

Float chamber.

In connection with the description of this usual accessory attention is invited to Fig. VII wherein will be seen a casting 52 so built with duplicate parts as to make possible the reversibility of its use as to enable it to best accommodate itself to the available space chancing to be afforded. The chamber is provided below and at opposite ends with hollow extensions 53 and 54 each provided with an angular that is inwardly and upwardly directed duct 55 and 56 respectively and each of which latter passes through an upwardly projecting boss fashioned as an enlargement to form seats 57 and 58 respectively. According to the view seen in Fig. VII the opening 55 is utilized as the inlet and accordingly effects the connection by means of a union with a pipe 59 leading to the gasoline tank. As so premised the alternative inlet 56 may be closed

by a cap 60. The bottom of the chamber 52 is provided with a thrust bearing 61 while the cover 62 attached in any suitable manner likewise supplies a centrally disposed thrust bearing 63 in line with the other. A spindle 64 disposed in such bearings centers a float 65 for up and down movement within the chamber. The cover 62 is additionally provided with a pair of bosses having bearings 66 and 67 directly above the seats 57 and 58 respectively.

That particular bearing 67 which is above the seat 58 which is in communication with the closed inlet may be itself temporarily closed by means of a plug 68. Passing through opposite ends of the float chamber and near the top thereof are a pair of pins 69 and 70 which may be seen in Figs. I and III. Passing through the bearing 66 and into the upwardly directed enlargement of the inlet 55 is a rod 71 having a pointed extremity 72 adapted to effect a closure against the seat 57 and thereby cut off the supply of fuel to the float chamber. The pin 69 is intended, agreeable to the selection which has been arbitrarily made, to serve as an intermediate fulcrum for a lever 73 one end of which articulates with the rod 71 and the other forked end of which carries a pair of adjustable screws 75 for engagement with the top of the float 65. A drain cock 76 communicates with the bottom of the chamber, as does also a hollow extension 77 having three upwardly projected branches 78, 79 and 80. It is to these branches that the common type of fuel nozzles 81, 82 and 83 respectively are connected. A removable screw plug 84 permits of access into the hollow extension 77 for the purpose of cleaning the same. Passing through the portion 22 of the bent tube which leads from the first source of fuel to the first inlet is a set screw 85, and similarly projecting from below through the tubes 32 and 42 are a pair of set screws 86 and 87 respectively. The inner extremities of these three set screws are fashioned as needle points 88, 89 and 90 which are adapted to project into the mouths of the nozzles 81, 82 and 83 respectively to thus increase or diminish the size of the orifice through which the fuel is drawn in a manner well known to the art.

Throttle control.

Fixed in the lateral opening 18 is a bushing 91 which is held in place by three screws 92 as appears in Figs. II and IV. Mounted for movement in the bushing 92 is a shaft 93 having an actuating arm 94. The inner end of the shaft 93 is squared and is closed by a pinion 95 disposed in the longitudinally extending median line of the carbureter proper or in line with the axes of the valve openings 5, 7, 9 and 11. Such pinion is shown held in place by a nut 96 engaging

the screw threaded extremity of the shaft 93. Attached in any feasible manner to the same side of the casing 1 some distance above the shaft 93 is a segmental dial 97 which is best shown in Fig. II. The outer portion of the shaft 93 carries a pointer 98 which projects at an angle with reference to the direction of projection of the arm 94 and is adapted to play over the dial 97 in order to indicate the results which the various positions of the arm 94 are calculated to effect. Extending through the bearings 14 and 26 is an actuating stem 99 which is provided on each of its outer ends with a pair of lock nuts 100 for limiting the range of movement thereof. The construction now being described is most clearly shown in Fig. V. Within the mixing chamber 4 the stem 99 carries a valve member 101 which is adapted to fit and hence close the opening 5. Within the compartment 6 the stem 99 loosely carries a valve sleeve 102 adapted to fit and therefore close the opening 7. A third valve forming sleeve 103 loosely surrounds the sleeve 102 for movement within the compartment 8 and is similarly adapted to fit and accordingly close on occasion the opening 9. Still another valve forming sleeve 104 loosely envelops the rearward portion of the sleeve 103 and is designed with an annular flange adapted to fit and close the opening 11.

The valve forming sleeve 101 is fixed to the stem 99 by means of a pin 105. Surrounding the stem 99 between the valve 101 and the valve sleeve 102 is a toothed sleeve or rack 106 fixed by means of pins 107 and carrying on its under side the series of teeth 108 adapted to mesh with the pinion 95 as may be well seen in Fig. IV. Interposed between the shoulder forming surface 15 and the rear edge of the sleeve 102 is a spring 109 purposed normally to hold the sleeve 102 in its closed position against the valve seat of the opening 7, without however being enabled to exert any pressure against the rack 106 sufficient to move the stem 99 far enough to seat the valve 101. Likewise interposed between the shoulder forming surface 16 and the edge of the sleeve 103 is a spring 110 of larger diameter which is similarly adapted normally to hold the valve 103 against its seat without however adding forward pressure against the valve 102 as may be seen in Fig. V. Interposed between the end surface 17 and the sleeve 104 is a third compression spring 111 of correspondingly larger diameter and also acting to maintain the sleeve 104 in its closed position without however being capable of pressing forwardly against the sleeve 103 independently of any possible friction.

The gasoline enters the float chamber through the opening 59, Fig. VII,

whenever the float 65 is low enough to raise the rod extremity 72 from the seat 57. At that time the gasoline passing through the duct 55 fills up the float chamber and the passages 77, 78, 79, 80, 81, 82, 83, until a certain level at top of nozzle is obtained as indicated in Fig. IV. The float in rising raises the levers 73 which pushes down the needle valve 72, which latter shuts off the gasoline in channel 53 when the float has reached this predetermined level. At this time the carbureter is ready to be operated by a starting of the engine. The engine is put in motion by mechanical, electrical or manual exertion whereby to cause the piston inside of the cylinder to move and create a vacuum therein. This vacuum is communicated as a suction effect to the ports and thence to the valve 101, to the chamber 2, to the manifold and to the cylinder. The velocity of the air passing over top of the jet creates a suction in the nozzle jet sufficient to make the gasoline overflow, and the velocity of the air carries the gasoline on with it to the combustion cylinder of the engine. By pushing the lever 94 ahead, that is to the left as seen in Fig. II, the suction is increased, the velocity of the air increases and consequently the gasoline increases, but not proportionally to the air because the air is lighter than the gasoline so that the air is quickly checked after the engine valves are closed while the gasoline on the contrary is still overflowing due to its own weight. This makes an over rich mixture. For this reason we have the auxiliary air resistance chamber to compensate for overflow.

Operation.

Presuming the float chamber as filled to the depth required and continued flow into it ceased by reason of the float having reached a predetermined elevation and each of the needle valves 88, 89 and 90 adjusted to leave nozzle openings in accord with the discoveries of practical experience; the arm 94 may be swung a certain slight distance to the left as viewed in Fig. II to actuate the stem 99 in a rearward direction sufficient to move the valve 101 from its seat but insufficient to affect the engagement of the rack 106 with the valve 102. The extent of movement imparted to the valve 101 may of course be known by noticing the position of the pointer 98 with reference to the first division line on the dial. Under such conditions the other three valves 102, 103 and 104 are being held closed by the three springs 109, 110 and 111 respectively whereby the suction from the engine is enabled to draw fuel only through the opening 5 and consequently only from the nozzle 81. Such initial fuel supply is immediately mixed with air entering through the pri-

mary air supply ports 25 and after such mixture has followed the zig-zag path described by the portions 22, 21 and 20 it is permitted to draw an additional or auxiliary air supply coming through the ports 31 to meet the flow from a transverse direction. Presently as conditions warrant the arm 94 is swung still farther to the left until the sleeve 106 engages the valve 102 and moves it from its seat against the action of the spring 109. It is the position of the parts thus assumed which is particularly shown in Fig. V. When the valve 102 is opened the second nozzle 82 is permitted to functionate by becoming subjected to the suction effect whereby primary air is drawn through the ports 35 and auxiliary air through the openings 41. The air current flowing through the ports 41 encounters the carbureted mixture at right angles prior to conduction through the mixing chamber 4. When the arm 94 is moved still farther to the left precisely similar action ensues. Such movement of the arm 94 carries the valve 102 in engagement with the valve 103 to open the same and thus bring the nozzle 83 into play and permit the suction effect to draw fuel therefrom together with primary air through the ports 45 and thereafter auxiliary air through the ports 51. When the engine is to travel at its highest rate of speed the valve 104 may also be opened in the same manner whereupon a direct entry of air from the opening 13 is permitted in order to make the mixture of fuel relatively sparse. As is well known the carbureted mixture is required to be rich at the start and correspondingly diminished as the speed of the engine progresses.

I claim—

1. A carbureter comprising a mixing chamber provided with an outlet and a pair of alined inlets, one inlet communicating directly with said chamber and the second through the first, separate fuel conduits leading to said inlets, a member extended through said inlets, a pair of valves carried by said member for closing said inlets respectively, and means for successively operating said valves.

2. A carbureter comprising a mixing chamber, an air inlet therefor, fuel conduits communicating therewith through a common opening and having each an air opening, and air resistance devices communicating through all of said air inlets, said devices including hollow members one of which is inclosed by and spaced from the other and both of which are provided with openings at alternately different ends.

3. A carbureter comprising a mixing chamber provided with fuel and air inlets, a fuel conduit communicating with said fuel inlet and itself having a fuel inlet and a pair of air inlets located ahead and behind the same, a manually controlled valve between said chamber and conduit, a hollow air resistance device having a continuous passage in communication with said chamber inlet, and a pair of hollow air resistance devices provided with sinuous passages in communication with said inlets respectively, one of said passages furthermore communicating at an angle with respect to said conduit.

Signed by me, this 18th day of April, 1916.

FRANÇOIS RICHARD.