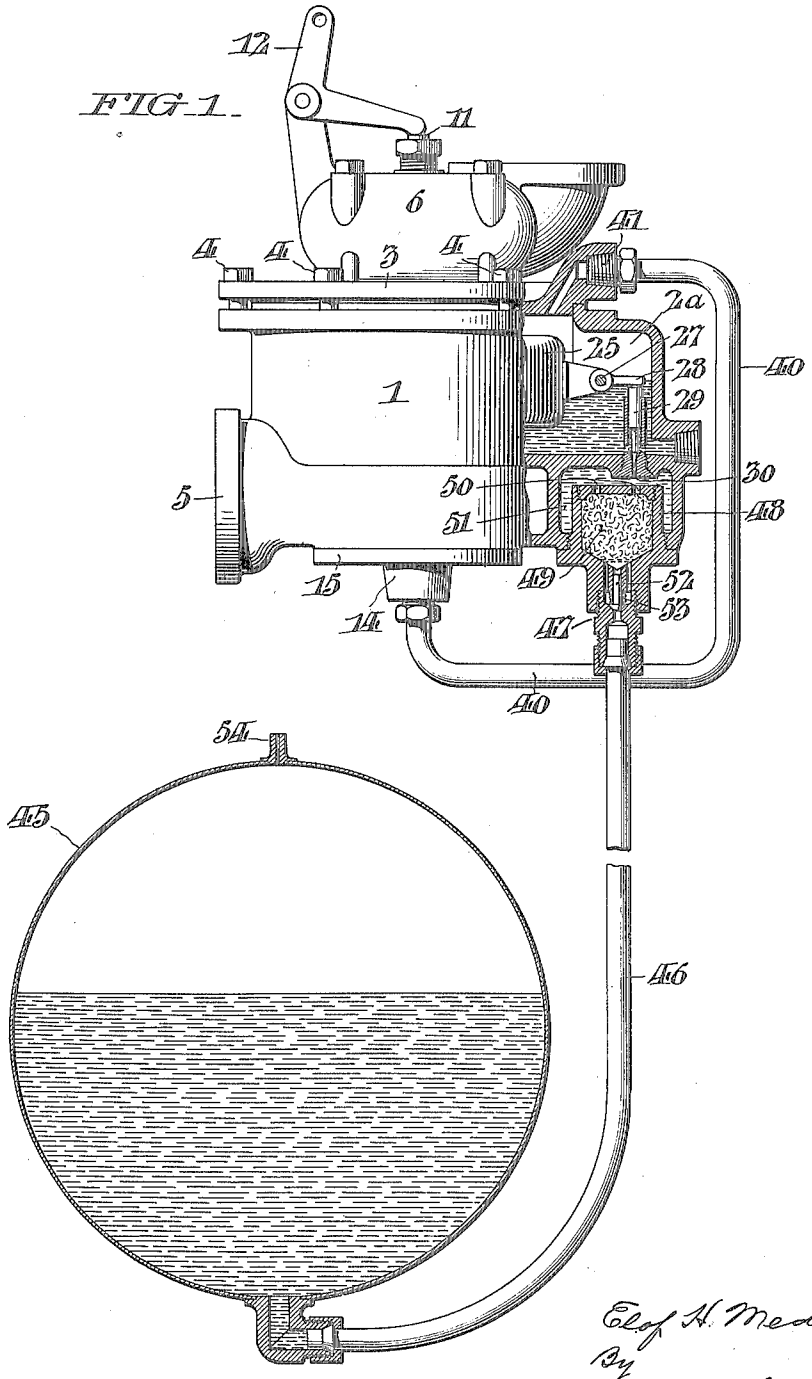
Jan. 9, 1923. 1,441,992.

E. H. MEDÉN.

CARBURETOR.

FILED DEC. 5, 1917. 4 SHEETS—SHEET 1.

FIG. 1.



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Jan. 9, 1923.

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E. H. MEDÉN.

CARBURETOR.

FILED DEC. 5, 1917.

4 SHEETS—SHEET 2.

FIG. 2.

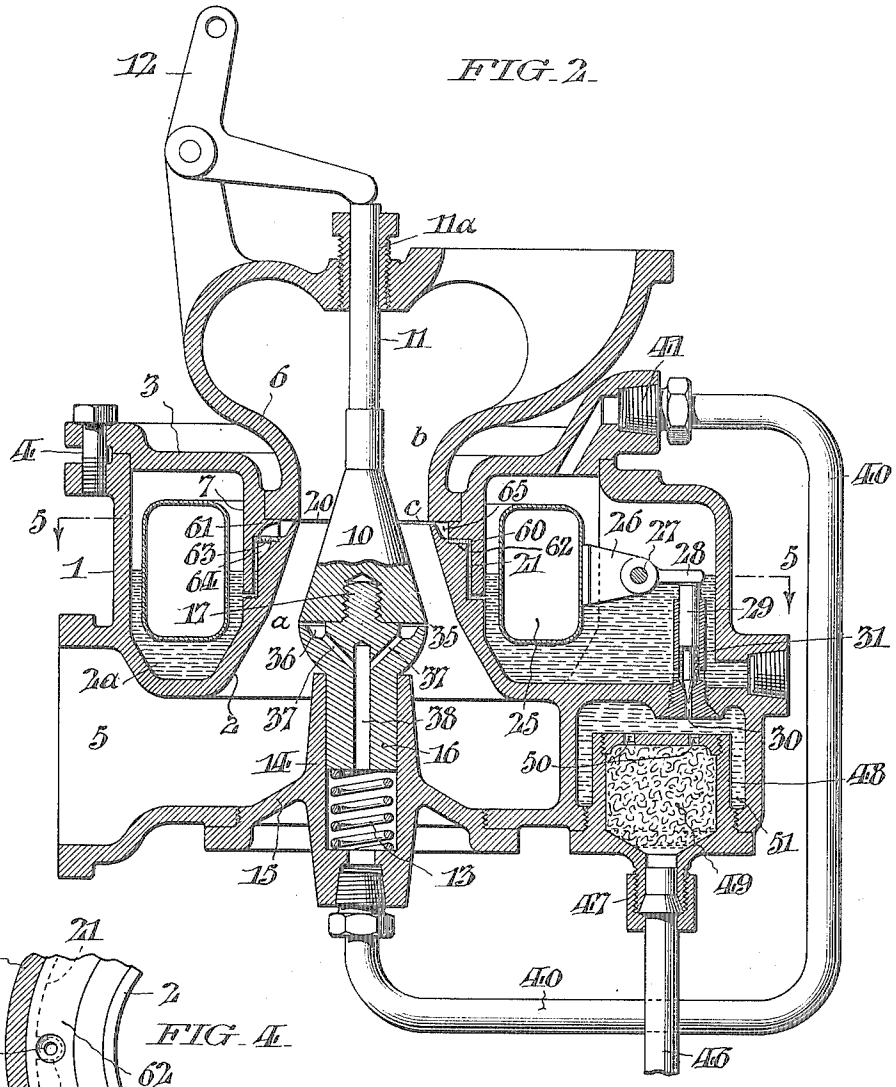
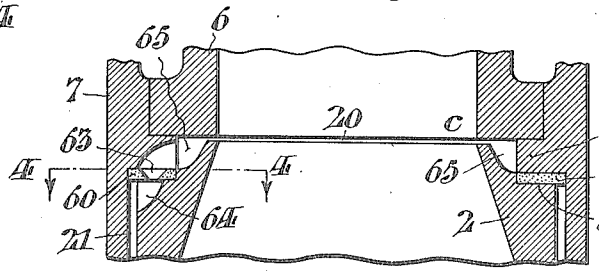


FIG. 4.

FIG. 3.



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FIG. 5.

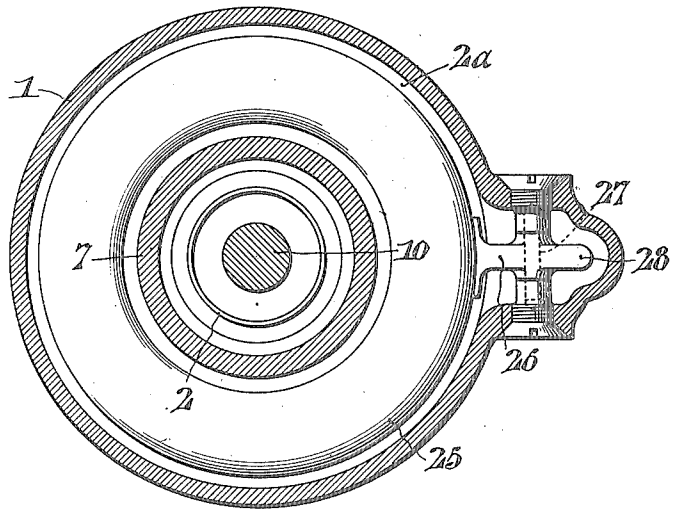


FIG. 6.

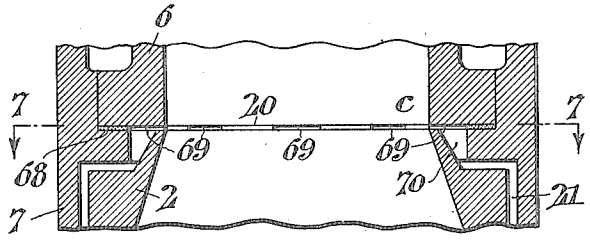
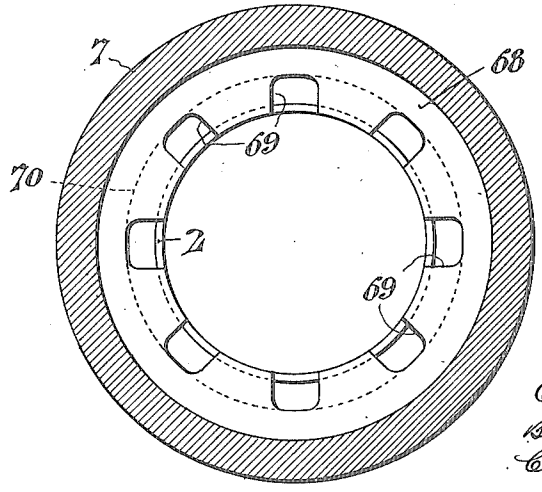


FIG. 7.



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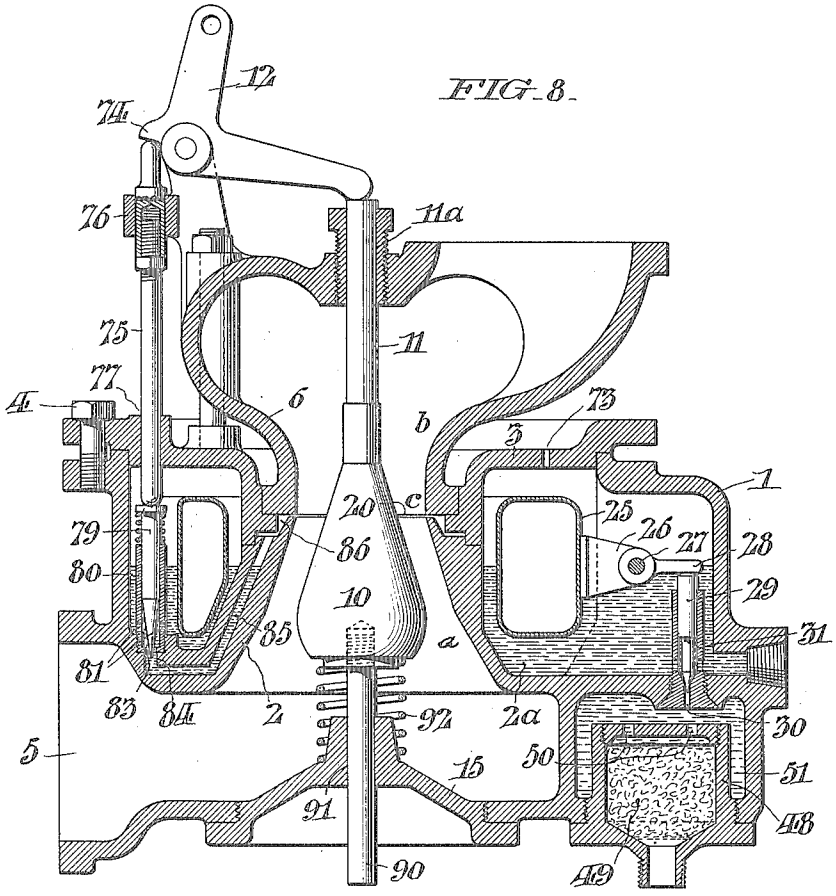
Jan. 9, 1923. 1,441,992.

E. H. MEDÉN.

CARBURETOR.

FILED DEC. 5, 1917. 4 SHEETS—SHEET 4.

FIG. 8.



INVENTOR

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Patented Jan. 9, 1923. 1,441,992

UNITED STATES PATENT OFFICE.

ELOF H. MEDÉN, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO AMERICAN GASACCUMULATOR COMPANY, OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CARBURETOR.

Application filed December 5, 1917. Serial No. 205,505.

To all whom it may concern:

Be it known that I, ELOF H. MEDÉN, a subject of the King of Sweden, residing in the city of Elizabeth, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Carburetors, of which the following is a specification.

My invention relates to carburetors and it has for its general object to provide new and improved means for carburetting air and thereby produce efficient combustible mixtures for use for such purposes as such mixtures are usually employed, particularly for internal combustion engines.

A further object of my invention is to provide means whereby the carburetor may be caused to quickly respond to the requirements of an engine, particularly an automobile engine, for rapid acceleration and retardation as the demand for power and speed varies and also to provide means for supplying the carburetor with liquid fuel from a main source of fuel supply without the intervention of means separate and independent of the carburetor.

In the construction of a carburetor embodying my invention I employ as a feature thereof a "Venturi" tube or passage through which the air which is to be carburetted is caused to flow, and it is a further object of my invention not only to provide means whereby the difference in pressures between say the throat portion and other portions of the "Venturi" passage or tube may be taken advantage of to effect not only a feeding or delivery of the liquid fuel to the said passageway but also to effect a measuring and proportioning of such liquid in relation to the quantity of the air which flows through the said passageway.

The principle of the "Venturi" tube or passage is well understood and will not be set forth to any extent here except to say that as the fluid flows through the converging portion its pressure gradually decreases until it reaches a point a slight distance beyond or posteriorly of the throat or point of greatest constriction. It is upon the principle of operation of a "Venturi" tube or passage as thus expressed that my invention is based and upon which the successful operation of the mechanism in which it is embodied depends.

Other objects and advantages of my invention will be referred to and more particularly described in the detailed description thereof which follows or will be apparent from such description.

For the purpose of enabling my invention and the principle of operation thereof to be more easily and readily understood and in order that its practical commercial advantages may be fully appreciated and comprehended reference may be had to the accompanying drawings in which I have illustrated certain forms of construction constituting convenient embodiments thereof.

In the said drawings:

Fig. 1 is a view partly in side elevation and partly in section of a carburetor construction embodying my invention and also showing a source of fuel supply and a connection between the same and the carburetor;

Fig. 2 is a longitudinal vertical sectional view showing a slightly modified construction;

Fig. 3 is a longitudinal vertical sectional view through a portion of the carburetor structure enlarged to show more clearly a detail of the construction;

Fig. 4 is a horizontal sectional view of a portion of said carburetor to show more clearly a detail of construction;

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 2;

Fig. 6 is a view similar to that shown in Fig. 3, but showing a modification of the construction;

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 6; and

Fig. 8 is a longitudinal vertical sectional view showing a modified construction of carburetor embodying broadly the features of my invention.

Referring to the drawings, 1 designates the outer portion of a part of the body of a carburetor structure having upon its inner side an upwardly and inwardly extending wall portion 2, the said inner portion 2 forming with the outer portion 1 an annular receptacle or chamber 2^a for holding liquid (hydrocarbon fuel). The annular receptacle is closed by means of a cover portion 3 secured to the top edge of the outer side of the part 1 by means of screw bolts 4 or otherwise as may be desired.

5 designates the inlet for admitting air to the carburetor. The said inlet passage is in direct communication with a "Venturi" passage formed by the inner surface of the wall portion 2 and by the inner surface of the wall portion of the outlet section of portion 6 of the carburetor structure. The outlet portion 6 is secured upon the inner side of the depending annular flange-like portions 7 of the cover member 3. The "Venturi" passage comprises that portion of the passageway through the carburetor between the letters *a* and *b*. As usual the said passage comprises converging and diverging sections. The throat, that is to say, the point of smallest sectional area of the passage is situated at *c*. It may be stated at this point that the pressure of the air at *a* is very near though slightly below normal atmospheric pressure and that such pressure gradually decreases from that point or plane to a point or plane slightly beyond the throat *c*, the point of greatest constriction. The pressure conditions in the converging approach part *a* to *c* of the passage are constant regardless of what may be the variations of pressure or other conditions in the outlet portion or receding flaring portion of the passage.

As has already been indicated, the velocity of the air at *c*, the throat of the passageway, is greater than at any other preceding section or portion of the passageway, consequently the pressure at that point is less than at any other preceding section or portion of the passageway. I have taken advantage of that velocity and pressure condition, as will be hereinafter more fully described, to effect an atomization and a feeding or supplying of fuel from the annular chamber 2^a into the "Venturi" passageway at its throat *c*.

For the purpose of regulating the quantity of air which may be permitted to flow through the "Venturi" passage I have provided a regulating member comprising a tapered part 10 (illustrated as of truncated cone shape) and a rod portion 11 projecting upwardly therefrom through an opening 12 in the top portion of the member 6 of the carburetor structure. By reason of the presence of this regulating member the "Venturi" passage is of annular shape in cross section. The lower part of the member 10 is provided with a portion of a diameter equal or nearly equal to that of the "Venturi" passage at its throat so that when the controlling member is in its uppermost position with the said portion in the plane of the throat of the "Venturi" passage the latter is closed or nearly closed. The position of the regulating member is controlled by the lever 12 and the expansion spring 13. The said spring is situated in a cylinder 14 formed in the cover 15 of the carburetor structure. The lower end of the said spring rests upon the bottom of said cylinder while the upper end bears against the lower end of a plunger 16 secured to the lower end of the part 10 by a screw threaded connection, as shown at 17.

The lever 12 may be controlled and operated manually by known means, not shown, or if preferred it may be operated by suitable means having connection with the fly ball governor of the engine. It is deemed unnecessary to show the means for operating and controlling the lever 12. The arm of said lever which extends toward the right contacts with the upper end of the rod 11 and may be caused to depress the regulating member from its highest to its lowermost position, the latter being substantially the position shown in Fig. 2 of the drawings, in opposition to the upward pressure exerted by the spring 13.

20 designates an annular opening, which opens into the "Venturi" passage in the plane of the throat section thereof. 21 designates an annular passageway communicating with the annular chamber 2^a and through which liquid from the said chamber is adapted to be supplied to the annular opening 20. The entry of liquid into the chamber 2^a is controlled by an annular float 25 provided with an arm 26 pivoted at 27, said arm having a projection or continuation 28 which is adapted to contact with a needle valve 29 which is adapted to open and close a passageway 30 through which liquid is adapted to pass or flow into the said chamber 2^a. A coiled spring 31 tends to hold the needle valve 29 in elevated position with the opening 30 open. The rising and falling of the float 25 in the chamber operates to open and close the needle valve 29 in obvious known manner.

35 designates an annular opening or passageway formed between the outer edge of the upper enlarged end of the plunger 16 and the outer edge of the lower end of the tapered member 10. The portions of the members 10 and 16 on opposite sides of and forming the said passageway 35 are of a diameter equal or nearly equal to the throat of the "Venturi" passage. The annular passageway 35 communicates with the annular groove 36 which is connected by openings 37 to a central opening 38 extending through the plunger 16 and communicating with the cylinder 14.

The said cylinder communicates through the pipe 40 with the upper side of the annular chamber 2^a, the connection being made at 41 with the cover member 3 of the carburetor structure.

It may be noted here that the shape of the part 10 and its relation to the wall of the "Venturi" passage is such that, regardless

of the position of the regulating member in the passage, the point of greatest constriction at the throat *c* remains the same.

It already having been stated that the pressure of the air in the "Venturi" passage at its throat *c* or point of greatest constriction is less than at any other portion of the approach part of the said passage and the said passage being in communication through the opening 35, the passageways 37, 38 and the pipe 40, with the top of the chamber 2^a, it is apparent that the greater pressure of air in the passage at or near the point *a* being exerted upon the top of the liquid in the chamber 2^a will cause it to flow outwardly through the annular passageway 21 and to be delivered through the opening 20 where the pressure is less, as described.

As the regulating member moves upwardly the partial vacuum at port 35 increases. This partial vacuum is communicated through the passages 37, 38, the lower portion of the cylinder 14 and the pipe 40 to the top of the float chamber. This increase in the partial vacuum maintained in the top of the float chamber tends to retard the flow of fuel therefrom. At the same time that the vacuum in the top of the float chamber is increased there is an increase in the vacuum at the point *c*, such increase tending to cause an increase in flow from the float chamber. The vacuum at the point *c*, however, does not increase as rapidly as that in the top of the float chamber; therefore, the net result of upward movement of the regulating member 10 is a retardation of flow, until when the regulating member reaches its uppermost position and the port 35 practically reaches the position *c* there is no flow at all.

By delivering the liquid fuel to the "Venturi" passage in the plane of its throat; that is, in the plane of smallest sectional area of the annular passage, at or near which point the velocity of the flow of air through the said passage is greatest I am enabled to effect the maximum of atomization thereof under all conditions of regulation and supply.

In all carburetors, as far as I am aware, when a regulating member, as for instance a valve, is suddenly opened or suddenly closed there is in the former case for a short period of time a lagging in the supply of fuel at the fuel jet or opening due to its inertia and in the latter case an excessive supply for a short period of time at the fuel jet or opening also due to inertia.

As a result of the construction and operation as thus far described I am enabled to employ a further very important improvement, viz the supplying of liquid from a source of main fuel supply positioned below the level of the carburetor without the necessity of employing artificial pressure higher than normal atmospheric pressure in the main supply tank or without the employment of an intervening "vacuum feed" apparatus as is now so often used for causing the liquid fuel to flow from the main supply tank to the float chamber.

The liquid is supplied from a main supply tank 45 through a pipe 46 connected at 47 to the lower reduced end of a receptacle or chamber 48 containing straining or filtering material 49. This chamber is in turn in communication through openings 50 with a chamber 51 with which the opening 30 communicates. 52 designates a check valve normally held in depressed closed position by means of a light coiled spring 53. The purpose of this valve is to prevent the return flow of the liquid from the carburetor to the main supply tank when the engine and carburetor are not working. 54 designates a vent opening in the tank 45.

In the construction shown in Fig. 2 I have omitted the check valve as the carburetor is operable without the presence of such valve.

In the construction shown in Figs. 1 and 2, as has already been described, the pressure of the air within the chamber 2^a and above the liquid fuel is less than normal atmospheric pressure; that is to say, there is a partial vacuum in the space above the said fuel. The interior of the tank 45 is in communication with the atmosphere through the vent opening 54. The excess pressure upon the surface of the liquid fuel in the tank 45 over that within the chamber 2^a is sufficient to cause a flow of the liquid fuel from the tank 45 through the pipe 46 and thence at intervals regulated by the float 25 into the said chamber 2^a.

Unless means were provided to prevent a too great or free flow of the liquid fuel from the fuel supply chamber 2^a it would be necessary to make the opening 20 very thin or narrow in order to prevent an excess discharge of liquid fuel into the "Venturi" passage. Such an opening would be likely to clog and thus cause trouble in the operation of the carburetor, hence I have provided means for further controlling the flow of liquid from the chamber 2^a to the opening 20.

In the construction shown in Figs. 2, 3 and 4 I have provided a washer 60 interposed between the lower side of an inwardly extending flange 61 formed upon the depending portion 7 of the part 3 and a shoulder 62 formed upon the outer side of the inwardly and upwardly extending wall portion 2. The annular liquid fuel passageway 21 terminates at and is closed by the said washer. The said washer is provided with one or more openings 63, one only being provided in the construction shown, in communication with the annular passageway 21

through a notch or notches 64 interrupting the shoulder 62. 65 designates an annular channel surrounding the outer upper edge of the wall portion 2, said channel being situated directly under the lower end of the part 6 and communicating directly with the opening 20.

The opening or openings 63 may be so dimensioned as to supply to the annular groove 65 a quantity of liquid fuel necessary to provide sufficient fuel to be discharged through the opening 20 into the "Venturi" passage. It is apparent that the opening or openings 63 may be made of considerable size so as to avoid the likelihood of clogging or closing and in view of the fact that the liquid fuel supplied therefrom is limited, as above described, it follows that the opening 20 may be made large enough to avoid clogging or stopping up.

In Figs. 6 and 7 I have shown a modification of the construction to control or regulate the flow of liquid fuel from the float chamber 2^a to the jet or opening 20. In the construction shown in these figures I have provided a washer 68 which is interposed between the lower end of the member 6, the upper side of the flange 61 and the upper end of the wall portion 2. The said washer 68 is provided with a series of notches 69 in the inner edge thereof, as best shown in Fig. 7.

The annular passageway 21 for the passage of the liquid fuel from the float chamber 2^a to the jet or opening 20 communicates at its upper end with an annular groove or channel 70 which is situated directly underneath the inner portion of the washer 68. The fuel is discharged from the groove or channel 70 through the openings formed by the notches 69 in the washer 68. Owing to the fact that the opening or jet 20 is not continuous but is interrupted by the portions of the washer between the notches it is apparent that the width of the said opening may be increased sufficiently to prevent the liability of the same becoming clogged or closed up.

The regulation of the flow of air through a "Venturi" passage provided in a carburetor by throttling the "throat" of such passage and discharging the liquid fuel into said passage at the said throat and thereby securing a maximum of atomization of said liquid is regarded by me as a principal feature of my invention. I also regard the method of measuring the fuel and delivering it to the "Venturi" passage in the proper proportionate amounts, as thus far described, an important feature of my invention, but such method or way of measuring and proportioning the liquid fuel is not essential to the proper atomization of such fuel; hence I have shown in Fig. 8 a modified construction of my invention showing another means of supplying liquid fuel from the annular float chamber 2^a.

In the construction shown in Fig. 8 the cover portion 3 is provided with a vent opening 73 whereby the space within the chamber 2^a is filled with air at normal atmospheric pressure.

The lever 12 is provided with a projecting shoulder 74 which contacts with the upper end of a rod 75 slidably supported in a bearing 76 near its upper end and in an opening 77 through the cover member 3. The lower end of said rod contacts with the upper end of a needle valve 79 supported in a tubular bearing 80 secured to the bottom of the annular chamber 2^a. Said tubular bearing is provided near its lower end adjacent to the bottom of said chamber with openings 81 through which fuel may pass or flow from the chamber 2^a. The said tubular bearing 80 is provided at its lower end with an opening 83 in registry with an opening 84 in communication with a passageway 85 formed in the bottom portion of the part 1 of the carburetor and in the inwardly and upwardly extended wall portion 2.

The upper end of the said passage terminates in an annular channel 86 which is in direct communication with the opening 20 in the plane of the throat of the "Venturi" passage.

The parts 10 and 11 of the regulating member are identical with the corresponding parts shown in Fig. 2 of the drawings. 90 designates a rod secured to the lower end of the part 10 and which extends through an opening 91 provided in the cover 15. A coiled spring 92 interposed between the said cover and the lower end of the member 10 tends to cause upward movement of the regulating member so as to cause movement thereof in such position that the part 10 at its largest diameter would contact with the inner walls of the "Venturi" passage at its throat c to close or practically close the same. Such upward movement of the regulating member takes place under the influence of the spring 92 when permitted by movement of the lever 20 in a direction to cause the said lever to release the said regulating member.

In the constructions embodying my invention which have been illustrated I have provided a "Venturi" passage, circular in cross section with a central movable regulating member, the presence of which forms with the walls of the passageway an annular passage.

By moving the said regulating member, as has been described, a variation of the transverse sectional area of the annular passage is effected to vary and control the quantity of air permitted to flow through the passageway.

It should be understood that changes may

be made in the details of construction embodying my invention, and that the same is susceptible and capable of embodiment in other forms of construction than those illustrated.

The "Venturi" passage instead of being circular in transverse section may be of any other shape.

It will be observed that the control of the flow of air through the Venturi tube is effected by relative movement between the regulating member 10 and the tube. In the construction as shown, such relative movement is effected by movement of the member 10. It is to be understood however that such change in relationship may be otherwise effected.

I claim:—

1. A carburetor provided with a "Venturi" passage, an opening into said passage at its throat and with a chamber for holding liquid fuel to be supplied to said passage through said opening, a regulating device situated in said passage, means for causing movement of said regulating device longitudinally of the said passage and a communicating connection between the top portion of the said chamber through a portion of said regulating device, said communication communicating with the said "Venturi" passage in a plane below the throat thereof, the plane in which said communication is located varying with the position of the said regulating device.

2. A carburetor provided with a "Venturi" passage, an opening into said passage in or near the plane of its throat, a chamber for holding liquid fuel, a passageway leading from said chamber to said opening whereby said fuel may be discharged through the latter into the said "Venturi" passage, a movable regulating device situated in the said Venturi passage, means for causing movement of the said device to vary the transverse sectional area of the said Venturi passage, including the throat thereof, and means intermediate said chamber and said regulating device whereby movement of the latter automatically causes a regulation of the supply of liquid fuel through said opening to said passage.

3. In a carburetor comprising a "Venturi" passage, a chamber for holding a liquid fuel and a communicating passage from said chamber to said "Venturi" passage communicating with the latter in or near the plane of its throat, the combination of a regulating device situated in the said "Venturi" passage, means for causing movement of said regulating device longitudinally of said passage, an opening in the side of said regulating device, a communicating connection between said opening and the top of said chamber whereby the pressure of air in said chamber is the same as the pressure in said "Venturi" passage in the plane where the opening in said regulating device is situated.

4. A carburetor comprising a "Venturi" passage, a chamber for holding liquid fuel, a passageway leading from said chamber and terminating in said "Venturi" passage at its throat through which liquid fuel may be discharged from said chamber into the said "Venturi" passage, a movable regulating device situated in said "Venturi" passage, means for causing movement of said device and a passageway leading from said fuel chamber at a point above the fuel therein and terminating in the side of said regulating device.

5. A carburetor comprising a "Venturi" passage having an opening therein in or near the plane of its throat, a chamber for holding liquid fuel, a passageway leading from said chamber to said opening whereby said liquid fuel may be discharged through said opening into said "Venturi" passage, a regulating device situated in said "Venturi" passage, said device comprising a tapered portion which forms with the surrounding walls of said "Venturi" passage an annular passageway, the said regulating device having an opening in the side thereof and the transverse sectional area of the said regulating device in the plane of said opening being substantially equal to that of the transverse sectional area of the "Venturi" passage at its throat, means for causing movement of said regulating device in the said passageway, a communicating connection between the opening in the said regulating device and the upper part of said chamber, whereby the pressures at the different points in the approach part of the said "Venturi" passage may be transmitted to the said chamber.

6. A carburetor comprising a passageway therethrough for air, an opening into said passageway, a chamber for holding liquid fuel, a passage for supplying liquid fuel from said chamber to the opening into said air passageway, means for restricting the flow of liquid fuel through the passage from said chamber to said opening, a regulating device situated in the said passage for air, means for causing movement of said regulating device and means intermediate said chamber and said regulating device whereby movement of the latter automatically causes a variation in the supply of liquid fuel from said chamber to said opening.

7. A carburetor comprising a "Venturi" passage, an opening into said passage at or near its throat, a chamber for holding liquid fuel, a passage from said chamber to said opening, a regulating device situated in said "Venturi" passage, said regulating device having an opening in its sides and the said device terminating at its lower end in a

plunger, means for causing movement of said regulating device longitudinally of said "Venturi" passage, a cylinder in which the said plunger works, the said plunger having an opening therethrough in communication with the opening in said regulating device and a communicating connection between the said cylinder and the top of said chamber.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 29 day of November, A. D. 1917.

ELOF H. MEDÉN.