C. L. RAYFIELD.

CARBURETER.

APPLICATION FILED SEPT. 15, 1916.

1,352,628.

Patented Sept. 14, 1920.

3 SHEETS—SHEET 1.

Fig. 1

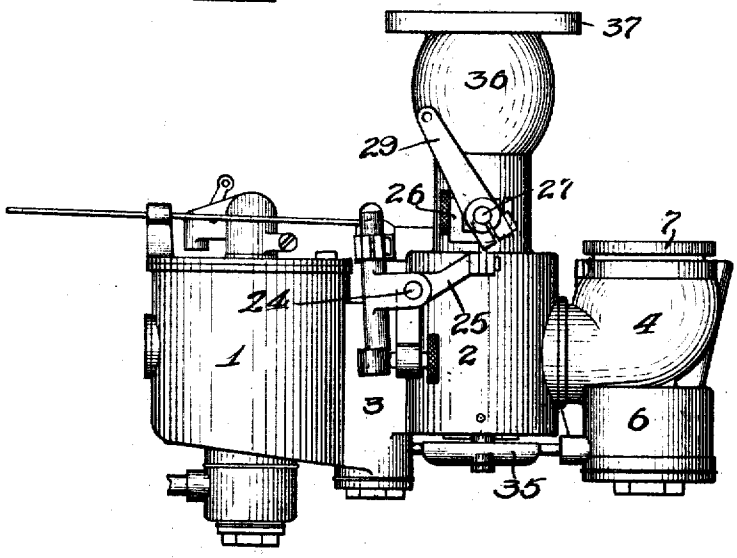

Fig. 3

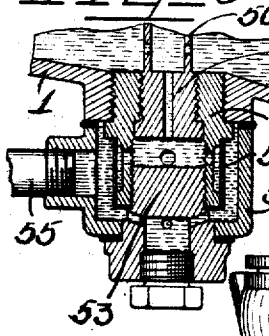

Fig. 2

Witnesses

J. W. Angell

Charles A. Hall Jr.

Inventor

Charles L. Rayfield

by Charles A. Hill Atty.

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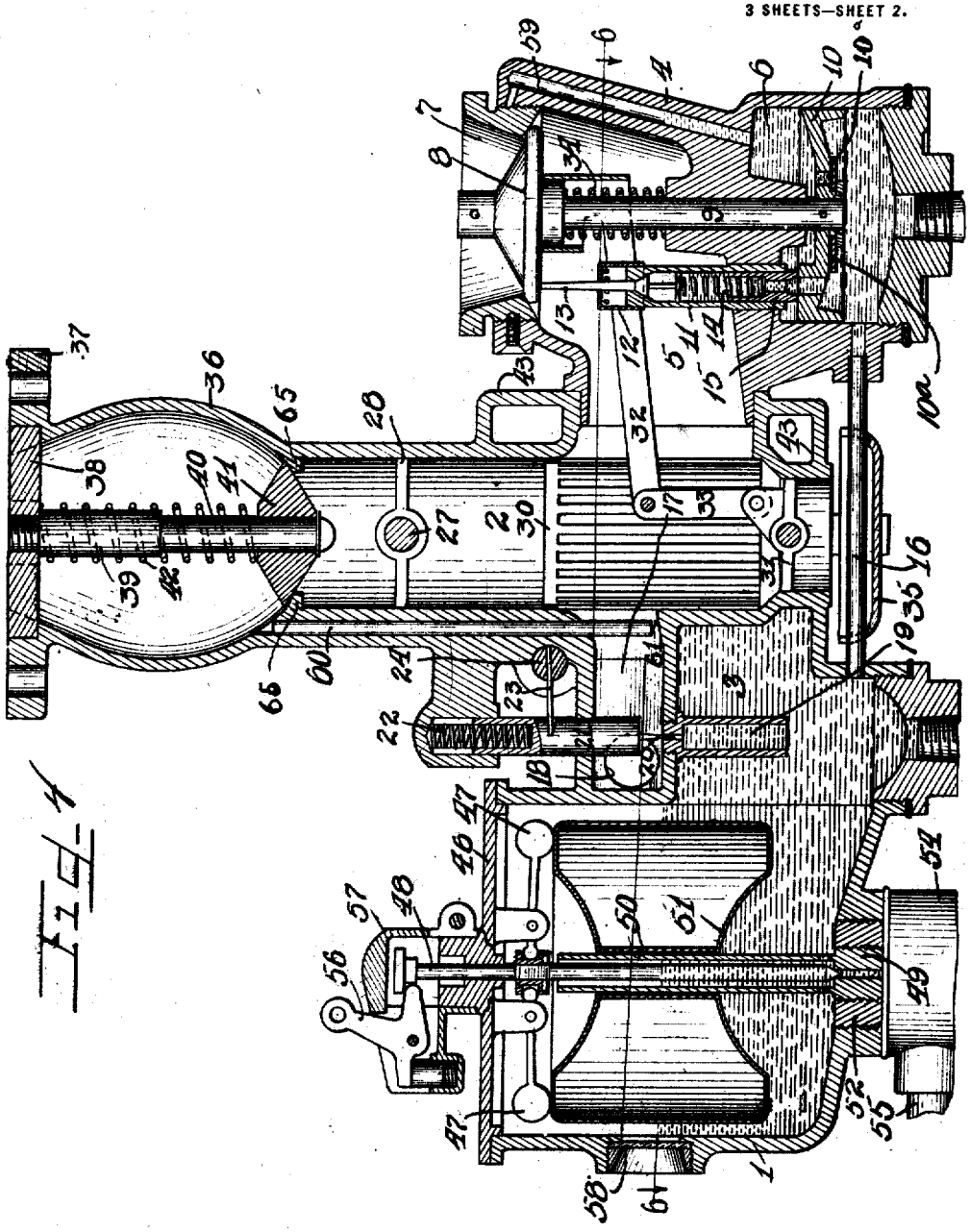

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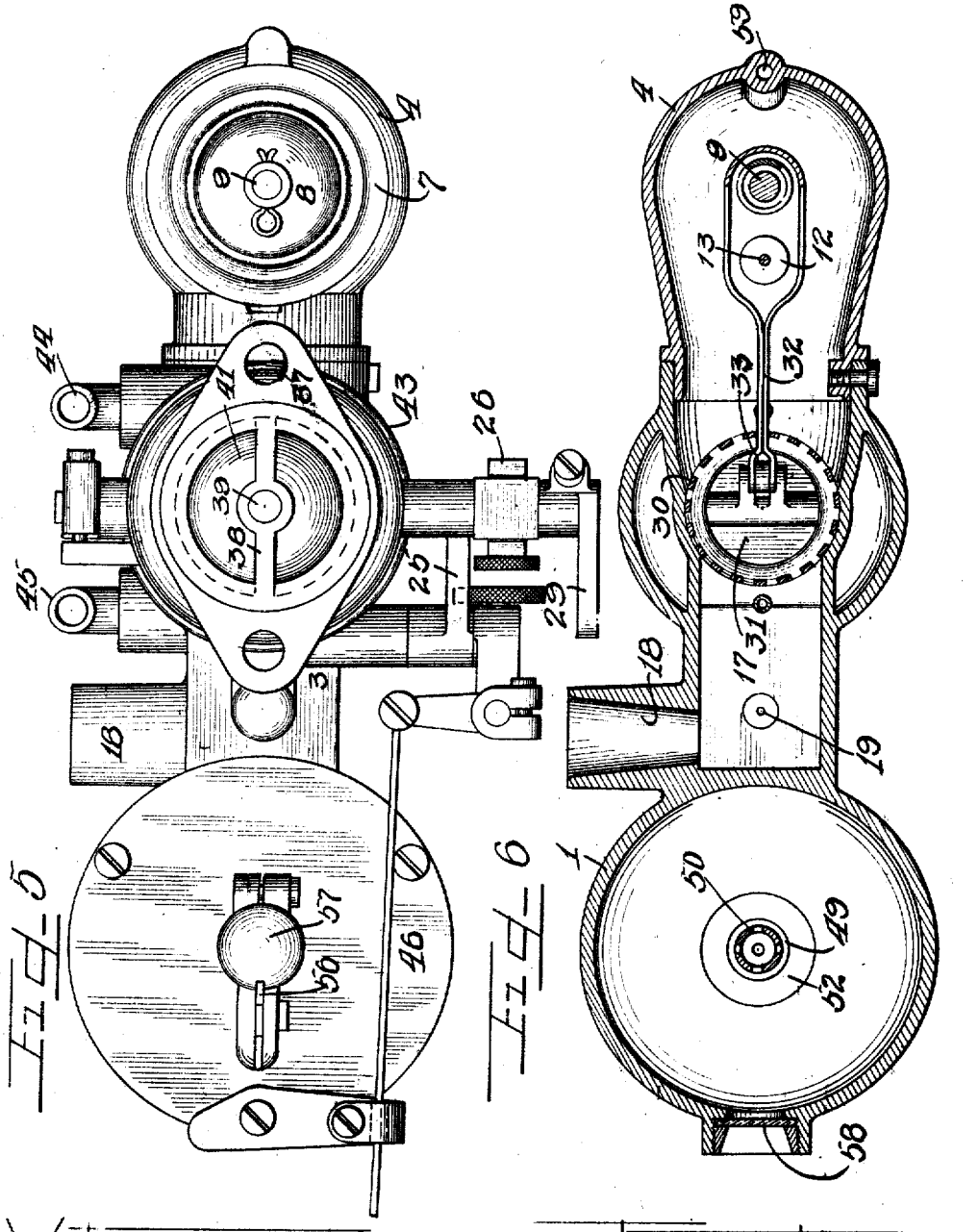

Fig. 5

Fig. 6

Witnesses

J. W. Angell

Charles Kellogg.

Inventor

Charles I. Rayfield

Charles O'Neill Atty.

UNITED STATES PATENT OFFICE.

CHARLES L. RAYFIELD, OF CHICAGO, ILLINOIS, ASSIGNOR TO PINDEISEN & KROPF MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CARBURETER.

1,352,628. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed September 15, 1916. Serial No. 120,231.

To all whom it may concern:

Be it known that I, CHARLES L. RAYFIELD, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbureters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to an improved type of carbureter wherein an automatic governing means is provided beyond the throttle valve of the carbureter together with automatically controlled air inlet means serving to bring into operation an auxiliary fuel supply mechanism for an additional quantity of fuel for the mixture.

It is an object therefore of this invention to construct a carbureter provided with a mixing chamber with the outlet therefrom controlled by a throttle valve, and with mechanism beyond the throttle valve actuatable by the draft beyond the throttle valve to control the flow of mixture through said outlet, and with means disposed at the inlet side of the throttle valve for admitting air over fuel jets to carburet the air.

It is also an object of this invention to construct a carbureter wherein side inlets for the mixing chamber are provided, each of said inlets provided with fuel nozzles to carburet the air entering therethrough, and with mixing means disposed at the point of entrance of the air and fuel into the mixing chamber together with mechanism beyond the throttle valve which controls the flow from the mixing chamber adapted to normally close the passage from the carbureter and to open automatically under draft exerted by the engine on which the carbureter is used.

It is also an object of this invention to provide a carbureter construction embracing a float chamber, a dash pot chamber in communication therewith, a piston in the dash pot chamber actuatable by an automatically operating air valve which serves further to operate an auxiliary air inlet into the side of the mixing chamber as well as to open a fuel nozzle, and with another fuel nozzle also adapted to carburet air entering the mixing chamber of the carbureter on the opposite side from said air inlet through a mixing means provided for the purpose.

It is furthermore an object of this invention to provide a carbureter having a mixing chamber with side inlets leading thereto, provided with fuel supply means for carbureting the air entering into the carbureter, and further provided with means beyond the throttle valve which controls the flow of mixture from the mixing chamber into an auxiliary mixing chamber operating normally to close the outlet of the mixing chamber beyond the throttle valve except for a by-pass for the mixture formed in the casing of the carbureter, and adapted to open under the draft exerted by the engine to which the carbureter is connected, to permit flow of mixture governed by the throttle valve, to take place.

It is finally an object of this invention to construct an improved type of carbureter embodying a number of features contributing toward perfect carburation under all conditions of load upon the engine with which the carbureter is connected, and particularly adapted to supply a rich mixture when acceleration loads are imposed on the engine.

The invention (in a preferred form) is illustrated on the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevation of a carbureter embodying the principles of my invention.

Fig. 2 is a similar view of the other side thereof.

Fig. 3 is a central sectional detail taken through the lower end of the float chamber of the carbureter.

Fig. 4 is an enlarged central vertical section taken longitudinally through the carbureter with parts broken away and parts shown in elevation.

Fig. 5 is a top plan view of the carbureter.

Fig. 6 is a detail sectional view with parts omitted taken on line 6—6 of Fig. 4.

As shown in the drawings:

The float chamber and mixing chamber of the carbureter are cast integral with one another, the float chamber being denoted by the reference numeral 1, and the mixing chamber by the reference numeral 2, and

that portion of the casing connecting the two chambers cored out on its interior denoted as a whole by the reference numeral 3. An opening is provided in one side of the mixing chamber 2, and attached thereon is a cored out casing 4, affording on its interior an air inlet passage 5, and further provided with a dash pot chamber 6, at the lower end thereof. An adjustable ring seat member 7, is threaded into the upper end of the casing element 4, for an automatic air valve 8, rigid on a stem 9, slidably mounted through the top wall of the dash pot chamber 6, and at its lower end therein provided with a piston 10.

Mounted within said inlet passage 5, communicating with the interior of the dash pot 6, is a fuel nozzle 11, having an apertured spray head 12, on the upper end thereof and provided with a tapered metering pin 13, projecting upwardly through the end of the nozzle 11. Said metering pin is normally impelled upwardly in said nozzle into closed position by a spring 14, coiled within said nozzle and seated upon a tubular member 15, which is secured upon and communicates through an aperture in said piston with the dash pot beneath the piston. Said metering pin 13, is adapted to be depressed to open the nozzle proportionately with the downward movement of the air valve 8. A flat disk valve 10^a, is slidably mounted on the under side of the piston 10, acting automatically as a check valve to close over an aperture therethrough when the piston is depressed and of course opening said aperture when the piston is elevated. A pipe line connection 16, leads from the lower portion of the casing 3, which, as shown in Fig. 4, is in communication with the float chamber 1, to said dash pot chamber 6, communicating therewith. Formed in the casing portion 3, of the carbureter, is an inlet air passage 17, provided with an outwardly flaring air inlet port 18, as clearly shown in Fig. 6, and, secured from beneath through a threaded aperture in the floor of said inlet passage 17, is a tubular fuel nozzle 19. The flow of fuel through said fuel nozzle 19, into the air passage 17, is controlled by a needle valve 20, on the lower end of a vertically slidable stem 21, which is impelled toward closed position by a coil spring 22, seated in the recessed upper end thereof bearing within the recessed extension on the carbureter casing in which said stem is slidably mounted.

The needle 20, is adapted to be adjusted to different positions by elevating the stem 21, by means of a short crank arm 23, which engages a notch in said stem 21, said crank being secured in a horizontally journaled shaft 24, of the carbureter casing. A bell crank 25, is secured upon the outer end of the shaft 24, and one arm thereof is in a position to be contacted by a cam 26, secured upon a shaft 27, on which a throttle valve 28, is mounted within the carbureter and provided with a throttle actuating lever 29, on the outer end of said shaft for actuating the same. A detailed description of the mechanism for operating the needle valve and its interconnection and adjustment of parts with respect to the throttle valve as well as the means for actuating the same for priming purposes, is not believed to be necessary in view of the fact that this is a well known construction in carbureters I have invented heretofore, and is shown in many of my issued patents, namely, No. 1,193,820, dated August 8th, 1916, No. 1,224,207, dated May 1st, 1917, and No. 1,224,209, dated May 1st, 1917.

Mounted within the mixing chamber of the carbureter, is a cylindrical grid mixing member 30, through which the air and fuel entering into the mixing chamber from the respective passages 5 and 17, is constrained to pass. A butterfly valve 31, is pivoted at the lower end of the mixing chamber 2, and is connected for positive operation to open position simultaneously with the opening movement of the automatic valve 8. For this purpose, a long yoke lever 32 is rigidly secured to the under side of said air valve 8 at one end, and extends into the mixing chamber 2, and is pivotally connected by means of a link 33, with said butterfly valve 31. A coiled spring 34, is disposed beneath the air valve 8, wound about the stem 9, thereof, and acts normally to impel said air valve 8, upwardly into closed relation with its ring seat member 7. A shallow dish member 35, is spaced below the lower end of the mixing chamber to receive any excess liquid admitted into the mixing chamber or any condensation of the fuel within the carbureter which after being condensed would pass downwardly through the mixing chamber.

A bell-shaped auxiliary mixing casing 36, is formed integral with the upper end of the mixing chamber 2, beyond the throttle valve 28, therein, provided with an attaching flange 37, by which the carbureter is attached to the manifold of an engine. Secured across the upper open end of the bell-shaped casing 36, is a spider 38, and secured in said spider and extending downwardly, is a tubular sleeve 39, within which is slidably mounted a stem 40, having a puppet valve 41, rigidly secured on its lower end, normally impelled downwardly by a spring 42, coiled about said telescoping stem and sleeve to hold said puppet valve sealingly across the upper open end of the mixing chamber 2. Inwardly extending lugs 65 on the wall of the casing support the valve 41 in the lowermost position.

A water jacket 43, is formed around the

mixing chamber 2, of the carbureter, and is provided with an inlet 44, and an outlet 45, as shown in Figs. 2 and 5. A cover 46, is provided for the float chamber 1, and has pivoted on the under surface thereof gravity acting levers 47, which serve to normally maintain the needle valve stem 48, which is slidably mounted in said cover, elevated from an inlet fuel supply passage formed in a passaged plug 49, connected on the lower end of the float chamber. Said stem 48, moves within a long tubular sleeve 50, formed integral with said plug 49, and having apertures in the lower end thereof, through which the fluid may flow into the float chamber as it enters from the axial passage through said plug 49. A hollow spun metal float 51, is slidably mounted upon said centrally disposed sleeve 50, and as the level of fuel in the float chamber rises, is adapted to elevate the gravity acting levers 47, to depress the stem 48, to close the entrance passage for fuel into the float chamber. Said plug 49, is threaded into another plug 52, which is threaded into the lower end of the float chamber 1, and is provided with passages therethrough beneath the plug 49. Threaded into the lower end of said plug 52, is another passaged plug member 53, which serves to clamp an annular ring member 54, scalingly on the lower end of the float chamber 1, having an inlet pipe for fuel 55, connected into one side thereof. A screen 56, surrounds the lower end of the plug 52, within the portion closed by the annular member 54, through which the fuel introduced through the supply pipe 55, is constrained to flow before passing upwardly into the float chamber through the passages provided therefor.

A lever 56, is pivoted in a housing 57, on the cover 46, of the float chamber, and is adapted to elevate the stem 48, to lift the needle valve from its seat and permit flooding of the carbureter for priming purposes when desired. A small circular pane of glass 58, is mounted in a view aperture in one wall of the float chamber 1, to ascertain the level of fluid therein.

At one end of the carbureter within the casing member 4, a long upwardly directed stand-pipe passage 59, is provided communicating into the upper end of the dash pot chamber 6, and leading upwardly and branching laterally into the threaded connection of the ring member 7, with the upper end of the casing 4. A pipe 60, is mounted within the cored out passage at one side of the upper end of the mixing chamber 2, the lower end of said pipe projecting downwardly closely adjacent to the floor of the inlet air passage 17, the floor at this point of communication of the passage 17, with the mixing chamber 10, being slightly inclined upwardly as denoted by the reference numeral 61, and the upper end of said pipe 60, communicates into the bell-shaped carbureting chamber 36, beyond the throttle valve 41, as shown in Fig. 4.

The operation is as follows:

When the motor upon which the carbureter is attached is running, the air for carburation is drawn inwardly past the air valve 8, which automatically opens against the compression of its spring 34, and also serves to open the butterfly valve 31, through the levers 32 and 33. The fuel for the mixture is supplied through the main fuel nozzle 19, which receives a draft thereacross from the constantly open air port 18, as well as through the fuel nozzle 11, which is opened, due to depression of the metering pin by downward movement of the air valve 8. The suction induced through the carbureter by the engine serves to elevate the valve 41, against the compression of its spring disposed in the bell-shaped chamber 36, beyond the throttle valve 28, allowing the mixture which flows in amounts dependent upon the adjustment of the throttle 28, past said valve 41, to thoroughly intermix within the auxiliary mixing chamber 36, before passage into the manifold of the engine.

For very slow or idling speeds, the valve 41, beyond the throttle valve 28, remains closed as well as the fuel nozzle 11, and air is drawn through the port 18, together with fuel flowing from the nozzle 19, and the mixture flows upwardly through the by-pass pipe 60, around the throttle valve and valve 41, into the carbureting chamber 36. Sudden acceleration load demands upon the engine as for instance when the throttle valve 28, is suddenly thrown into open position, produces a sudden draft through the carbureter, causing an abrupt depression of the automatic air valve 8, which serves to drive the piston 10, downwardly in the dash pot, thereby causing fuel under pressure to flow upwardly through the tubular member 15, and into the fuel nozzle 11, from which it is emitted through the spray head 12, due to the depression of the tapered metering pin 13, by the air valve 8. The depression of the piston 10, in the dash pot serves further to cause the fluid to back up through the pipe 16, into the float chamber, thereby raising the level therein so that a momentary flooding of the passage 17, takes places by a flow of fuel through the main nozzle 19. The long passage 59, formed in the casing 4, communicating with the dash pot 6, forms what might be termed a compensating air chamber, as it serves to relieve the vacuum effect on the upper side of the piston 10, when the same is moved quickly downwardly in the dash pot, and serves further to permit the piston to return upwardly again by relieving the pressure on the upper

side thereof when the air valve 8, tends to close. The cylindrical grid member 30, within the mixing chamber, serves to break up possible stratification of fuel and air entering into the mixing chamber through the respective passages 17 and 5, thus insuring good carburetion.

The piston 10, of the dash pot 6, connected to the air valve 8, serves to prevent fluttering of said air valve 8, to steady the same as well as the butterfly valve 31, in their various adjusted positions due to draft through the carbureter.

An adjustment of the carbureter may be effected by turning the ring seat member 7, to change the relative position thereof in the casing, so that the stress of the compression spring 34, upon the valve 8, is changed, and this adjustment serves also to vary the time of opening of the metering pin 13, of the fuel nozzle 11, with reference to the movement of the automatic valve 8. As already described the needle valve 20, for the main fuel nozzle, 11, is operated through a cam and lever connection from the throttle valve, and an adjustment to change the relative opening of the needle valve 20, with reference to movement of the throttle valve 28, is made possible by adjustment of the cam member 26, but since this is well known in construction in all my prior types of carbureters, a detailed description thereof is believed to be unnecessary.

I am aware that various details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. A carbureter comprising a mixing chamber, a throttle valve therein, a fuel supply nozzle adapted to supply fuel into the mixing chamber, an auxiliary mixing chamber above the throttle valve, a spider secured to the auxiliary mixing chamber, a stem secured thereto, an automatic valve adapted to cut off communication between the mixing and auxiliary mixing chambers, a stem secured thereto telescoping with the aforesaid stem, and a spring around said stems exerting a closing pressure on the automatic valve.

2. In a carbureter of the class described, a mixing chamber, an auxiliary mixing chamber communicating with the outlet from the mixing chamber, a throttle valve in the mixing chamber, an automatic valve controlling the flow of mixture from the mixing chamber into the auxiliary mixing chamber after passage past said throttle valve, an air and fuel inlet means communicating with said mixing chamber and a bypass communicating with the auxiliary mixing chamber and communicating with the air and fuel inlet means.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses:

CHARLES L. RAYFIELD.

Witnesses:
CHARLES W. HILLS, Jr.
EARL M. HARDINE.