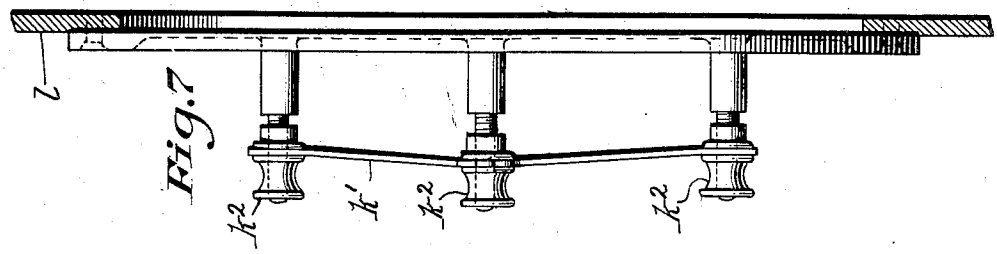
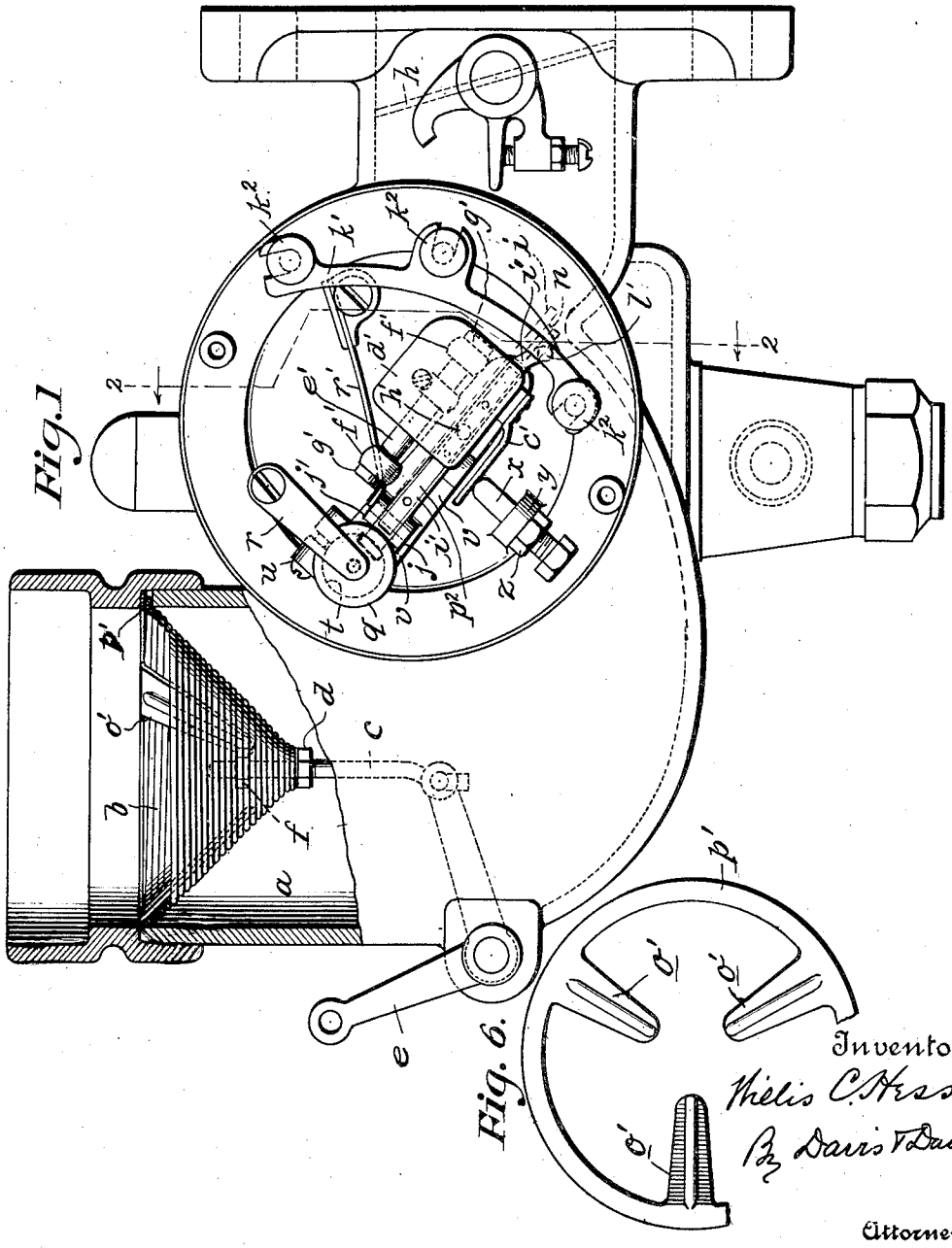
April 21, 1925. 1,534,212

W. C. HESS

CARBURETOR

Filed March 2, 1923 2 Sheets-Sheet 1





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CARBURETOR

Filed March 2, 1923 2 Sheets-Sheet 2

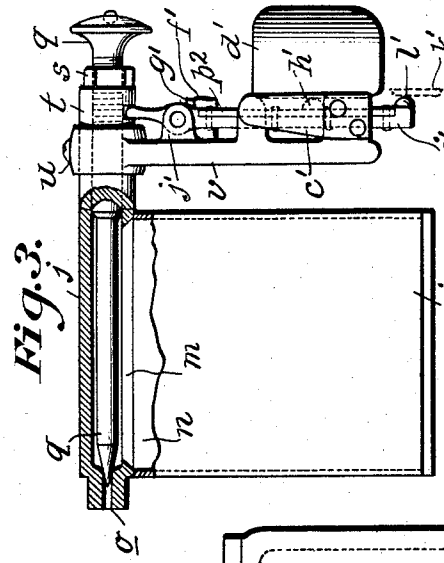


Fig. 3.

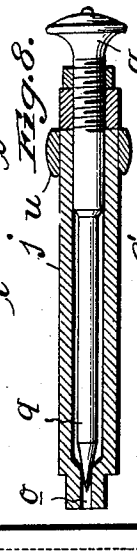


Fig. 8.

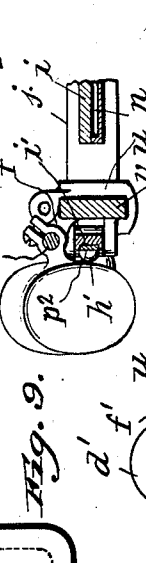


Fig. 9.

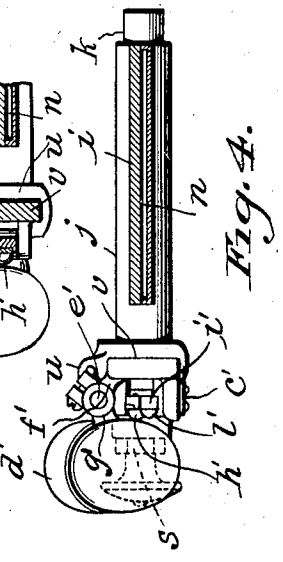


Fig. 4.

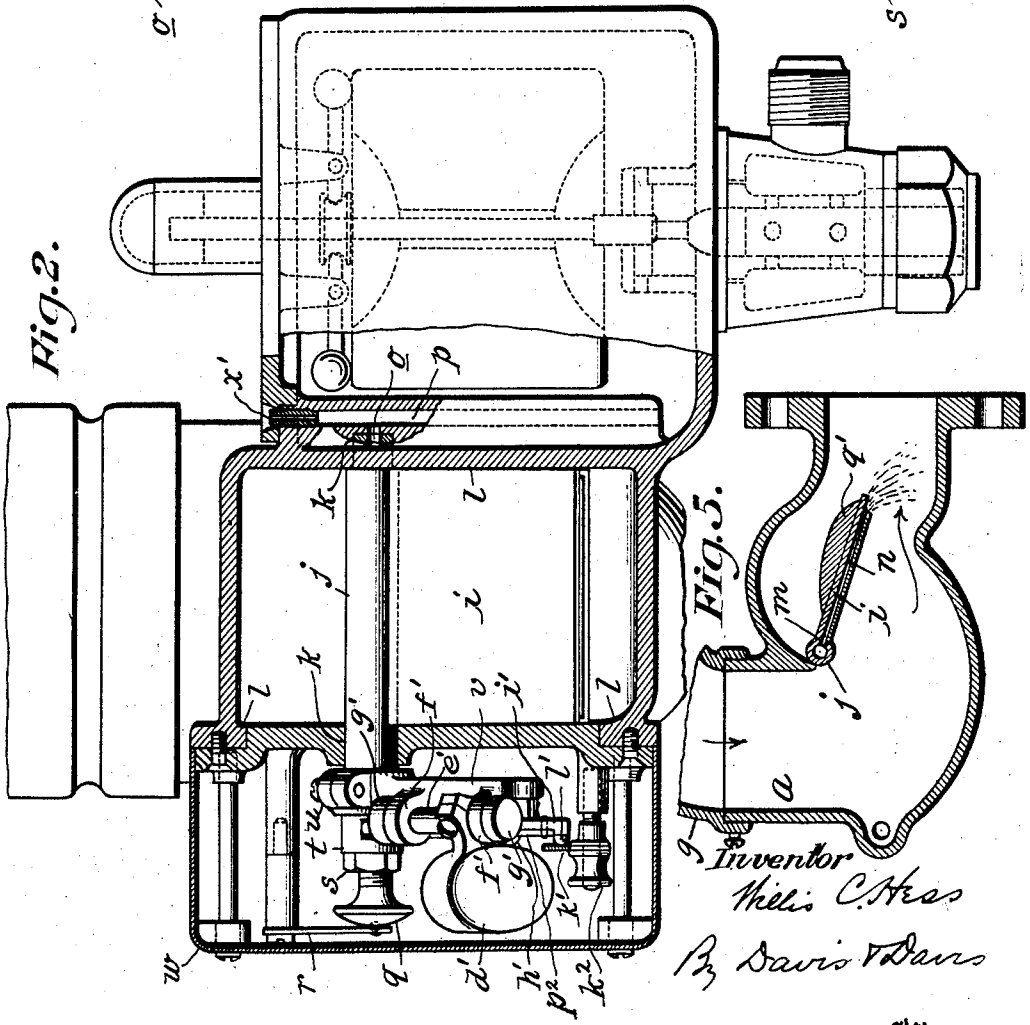


Fig. 2.

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIS C. HESS, OF DETROIT, MICHIGAN.

CARBURETOR.

Application filed March 2, 1923. Serial No. 622,403.

To all whom it may concern:

Be it known that I, WILLIS C. HESS, a citizen of the United States of America, and a resident of Detroit, county of Wayne and State of Michigan, have invented certain new and useful Improvements in Carburetors, of which the following is a full and clear specification.

The object of this invention is to provide simple automatic means whereby, after the feed-valve is manually set, the amount of fuel delivered into the atomizing-chamber will be at all times properly proportioned to the amount of air drawn thereinto at whatever speed the motor may be running, to thereby promote economy as well as smooth running of the engine at all speeds. There are other minor objects which will appear in the course of the following specification.

This application is a substitute in part for my copending application Serial No. 321,901, filed September 5, 1919.

In the drawing—

Fig. 1 is a side elevation with the inlet-pipe partly in section and the cover of the governor device removed;

Fig. 2 is a vertical sectional view;

Fig. 3 is a view partly in section showing the under side of the automatic feed-device;

Fig. 4 is a detail end view of the automatic feed-device, the pressure vane being shown in transverse section;

Fig. 5 is a vertical sectional view taken at right-angles to the line of the section in which Fig. 2 is taken;

Figs. 6 to 9, inclusive, are views of details hereinafter described.

In the drawing, *a* designates the air-inlet-pipe of the mixing-chamber which is adapted to be closed by a strangler-valve *b* consisting of a convolute wire-spring conical in shape and having its apex extending into the inlet-pipe while the base-coil of the cone rests on the outer end of the intake. Normally the coils are in contact with each other, but they are not in air-tight contact, so that a limited amount of air will pass into the intake between the coils. To close the coils tightly against each other and thus practically shut off all inlet of air, I provide means for bringing pressure to bear on the apex of the coil, this means in the present instance consisting of a rod *c* extending through the coil at the apex and provided with a nut-collar *d*, a suitable bell-crank arrangement *e* being provided for forcing the rod *c* endwisely downwardly to bring the collar *d* forcibly against the apex coil. To permit the coils of the spring to be separated by pulling the apex inwardly, I provide an additional nut-collar *f* on the rod *c*. The nut-collar *d* is threaded on the stem *c* for purposes of adjustment. It will be understood that the bell-crank arrangement *e* is adapted to be operated from the driver's seat of the vehicle in the usual manner.

In the outlet-end of the mixing-chamber is arranged the usual butterfly valve *h* which controls the amount of mixture which passes to the engine. The fuel supply is delivered into the mixing-chamber through the medium of a flat vane *i* affixed to a rock-shaft *j* extending transversely of the mixing-chamber and journaled at *k* in the opposite walls thereof, the side edges of the vane *i* fitting against the vertical straight side-walls *l* of the mixing-chamber. The vane extends from the shaft *j* toward the butterfly valve, i. e., in the direction of the current of air, so that the air current will tend to swing the vane upwardly and thus increase the area of the air-inlet. The rock-shaft *j* is hollow and its interior is connected by means of a long narrow slot *m* with a flat narrow space *n* formed in the vane and extending approximately the full area thereof, this space *n* being open along the entire free edge of the vane so that the fuel is delivered in a thin film off said free edge of the vane directly into the body of the ingoing air current, whereby the fuel will be ensured of a fine comminution and thorough mixing with the air before it reaches the engine. By delivering this fine film of fuel along the top of the air current, it will be observed that large particles of the liquid fuel will have to pass entirely through the air current before they reach the bottom of the mixing-chamber, whereby I reduce to a minimum the chance of these heavy particles of fuel being deposited in the bottom of the conduit on the way to the engine, it being a defect in most carburetors that unatomized particles of fuel will collect in the bottom of the fuel conduit and finally reach the engine in a liquid form, thereby not only rendering the running of the engine uneconomical but also interfering very materially with its smooth running.

One end of the hollow rock-shaft *j* is open,

as at *o*, and the supply of fuel is conducted to this open end of the shaft through the medium of a duct *p* which communicates at its lower end with the usual float-chamber, the float being arranged to maintain the level of the fuel in the conduit *p* at a predetermined point below the inlet *o*.

In the hollow rock-shaft is housed a needle-valve *q* which is adapted to be adjusted manually as well as automatically. This needle-valve extends into the shaft from the end opposite the inlet *o*, and it is normally pressed toward its seat by means of a flat spring *r*, shown in Fig. 2. The position of the needle-point with reference to its seat in the shaft *j* is determined by a nut *s* threaded on the outer end of the valve-stem and adapted to be screwed against a collar *t* threaded on the same stem between the nut *s* and the adjacent end of the shaft *j*. Affixed to the shaft *j* at a point adjacent the collar *t*, by means of a clamp *u*, is an arm *v* which extends radially from the shaft *j* and lies approximately parallel with the adjacent edge of the vane *i* but outside of the wall *l* of the mixing-chamber. The parts *s* and *t* are also outside of the mixing-chamber, these parts being desirably enclosed in a removable casing *w*, shown in Fig. 2, this casing and the aforesaid parts being affixed to the mixing-chamber at the opposite side from the float-chamber. It will be understood that all the parts carried by the shaft *j* together with all the parts carried by the arm *v* (said latter parts being hereinafter described) rock with the shaft *j* whenever the vane *i* is shifted by the incoming air current.

It will be understood that the vane and its attached parts tend to swing downwardly by gravity, but that in all positions of the vane the fuel-inlet *o* is open to the supply-conduit *p*. This tendency for the vane to swing downwardly and thus choke the inlet is resisted by a manually-adjustable device consisting of a set-screw *x* threaded to a lug *y* and locked by a lock-nut *z*, the end of the set-screw being adapted to bear against a flat spring *c'* affixed to the under side of the free end of the arm *v*. The arm *v* with its attached parts normally rests by gravity on the end of set-screw *x*. By adjusting the screw *x*, the position of the vane may be determined. The devices are usually set so that the vane shall occupy a position nearly closed, that position being sufficient to supply enough air and fuel to run the engine at its lowest speed. When the engine is accelerated, the inrushing air will swing the vane upwardly and thus increase the area of the inlet between the lower edge of the vane and the bottom wall of the mixing-chamber, and when the vane is thus automatically raised by air-pressure, I utilize this movement of the vane to increase the supply of fuel momentarily, so that at all times the predetermined proportions shall be maintained. These automatic devices consist of a weight *d'* affixed to a pivot-shaft *e'* mounted in ears *f'* carried by the aforesaid arm *v*, collars *g'* being affixed to said pivot-shaft *e'* to prevent endwise movement of the shaft in its bearings *f'*. This weight *d'* normally tends to swing downwardly in an oblique direction, this being due to the fact that the pivot-shaft *e'* is supported in an oblique position, parallel with the arm *v*, when the parts are in normal position. This weight rests gravitatingly against a boss *h'* carried by a lever *i'* pivotally mounted in ears *j'* carried by the lever *v*, the opposite (shorter) end of said lever *i'* having a loose engagement with the aforedescribed collar *t*, so that when the longer (free) end of the lever *i'* is swung toward its supporting bar *v* by means of the weight, the collar *t* will be moved outwardly and carry with it the needle-valve and thus permit an increased supply of fuel to the spreading vane *n*. It is obvious that when arm *v* is suddenly swung upwardly, the weight *d'* will, owing to its inertia, tend to stand still while the lever-arm *v* moves from its rest position, this movement being due to the action of the inrushing current of air upon the vane *i*. This inertness of the weight thus causes it to impose an excessive pressure on boss *h'* momentarily, thus causing the free end of the lever *i'* to be swung away from the inner side of the arcuate bar *k'* against which bar it is held normally in contact. The effect of this is to produce an additional supply of fuel momentarily, this being necessary when the throttle-butterfly is suddenly thrown open to permit an increased supply of air. In such case, the incoming air is of decreased density and is therefore less effective in drawing the proportional supply of fuel in through the normal nozzle-opening. It is, therefore, the object of the weight and its peculiar manner of mounting to momentarily increase the fuel supply to compensate for the decreased suction power of the incoming air at the moment of opening the throttle. This increase in the area of the normal feed-opening needs to be but temporary, as the incoming air quickly assumes its normal density in the mixing-chamber and is thereafter capable of pulling in the normal amount of fuel. This automatic temporary injection of additional fuel is important in that it makes it practicable to operate a carburetor efficiently on a normally lean mixture, thus greatly tending to eliminate carbon deposits in the cylinders of the engine and to also bring about a maximum of economy in the running of the engine.

Arcuate bar *k'* is adjustably mounted with in the casing *w* in position to overlie

the extended free end of lever i', so as to permit the lever to move in and out freely and yet form a guide or stop for the lever, a contacting boss l' being formed on the end of the lever i' to reduce friction. This bar k' restricts the outward swing of the lever i' against the action of the aforedescribed spring r, which constantly presses against the outer end of the stem of the valve q and thus serves to hold the needle-valve in its adjusted position against the tendency of said spring r to close the needle-valve. It will be understood, however, that this arcuate bar k' does not interfere with the free inward swing of the free end of lever i' under action of the weight d'.

It will be observed that the bar k' is mounted adjustably on three clamp-screws k^2 and that it is made of a thin flexible strip of metal to enable it to be flexed or warped into any desired shape consistent with the functions it is intended to perform. In this way, the position of the needle-valve q may be automatically controlled in action to give the required normal fuel-supply at any position of the pressure vane n, corresponding to any engine speed.

To maintain the conical shape of the spring-coil when pressed into closed position, I provide a plurality of fingers o' which depend into the coil and lie against the coils, these fingers being carried by a ring p' clamped on the top coil in any suitable manner.

The slight adjustments of the vane n to compensate for seasonal and other changes in temperature are obtained by a thermostatic device consisting preferably in affixing to the outer face of the lever i' a strip or bar p^2 of sensitive metal of the well-known kind, whereby increase in temperature will warp the bar and thus tend to increase the opening of the valve. To steady the movements of the vane n, I desirably affix to its upper face a weight q' and also provide a flat spring r' for the same purpose, this spring being affixed to the wall of the casing in such position as to bear lightly down on the lever v at a suitable point, as shown in Fig. 1.

In the top end of the fuel channel p, at a point above the normal level of the fuel in the floating chamber, I provide a bleed opening x', the object of which is to prevent siphonic action emptying the float-chamber into the mixing-chamber. It has been found in practice that when the engine stops, there is sometimes sufficient fuel in the hollow valve hub j and the flat distributing chamber n in the vane to cause a siphonic action that pulls gasoline out of the float-chamber and empties it into the mixing-chamber, this action being particularly promoted by the fact that upon cessation of the inrush of air by the stopping of the engine, the vane drops to normal, closed position. The provision of this bleed opening x will destroy this siphonic action. It will be understood that this opening is so small in diameter that the amount of air that will be drawn in through the opening during the operation of the carburetor will not materially affect the charge.

The nature and scope of the invention having been thus indicated and its preferred embodiment having been specifically described, what is claimed as new is:

1. In a carburetor, a pressure-operated vane having a hub at its upper end, said hub having a passage extending axially through it communicating with a distributing-chamber in the vane extending to its lower edge, said hub having journals which pivotally support the vane in the walls of the mixing-chamber, means for supplying gasoline to one end of said hollow hub, and a needle-valve adjustably supported in the other end of said hub and adapted to control the inlet of fuel at the opposite, inlet end of the hub.

2. In a carburetor, a pressure-operated vane having a hub at its upper end, said hub having a passage extending axially through it communicating with a distributing-chamber in the vane extending to its lower edge, said hub having journals which pivotally support the vane in the walls of the mixing-chamber, means for supplying gasoline to one end of said hollow hub, a needle-valve adjustably supported in the other end of said hub and adapted to control the inlet of fuel at the opposite, inlet end of the hub, and means mounted on the hub for momentarily increasing the opening of the valve when the vane is suddenly swung upwardly.

3. In a carburetor, a pressure-operated vane having a hub at its upper end, said hub having a passage extending axially through it communicating with a distributing-chamber in the vane extending to its lower edge, said hub having journals which pivotally support the vane in the walls of the mixing-chamber, means for supplying gasoline to one end of said hollow hub, a needle-valve adjustably supported in the other end of said hub and adapted to control the inlet of fuel at the opposite, inlet end of the hub, and means mounted on the hub for momentarily increasing the opening of the valve when the vane is suddenly swung upwardly, said means consisting of an arm affixed to the hub, a lever pivotally mounted on said arm and having one end in engagement with the needle-valve, and a weight pivotally mounted on said arm and normally resting against said lever, for the purpose set forth.

4. In a carburetor of the class set forth, a swinging vane in the mixing-chamber having a free edge extending toward the outlet-end of the mixing-chamber, said vane being provided with an interior chamber having an outlet at the free edge of the vane to form

the inlet nozzle for the fuel, and means for supplying fuel to said chamber in the vane, said means embodying automatic devices for increasing the supply of fuel momentarily only as the vane is suddenly moved by the incoming air current, for the purpose set forth.

5. In a carburetor of the class set forth, a swinging member in the mixing-chamber adapted to be actuated by incoming air, means for manually setting said member for a normal supply of air, and means actuated by said member for increasing the supply of fuel momentarily only upon sudden increased pressure of incoming air against said member.

6. In combination with a mixing-chamber of a carburetor, a pressure-actuated member in the mixing-chamber and means for momentarily increasing the supply of fuel upon sudden actuation of said member by incoming air, said means embodying a needle-valve, devices for operating the same by means of a weight, and devices whereby the pressure of the weight momentarily increases by inertia as the air pressure against said swinging member shifts the same.

7. In a carburetor, a pressure-actuated member in the mixing-chamber adapted to be moved by an increased flow of air therethrough, and means for automatically momentarily increasing the fuel supply as said member is suddenly shifted by increased air pressure, said means consisting of an arm adapted to be swung from an inclined position upwardly toward a horizontal position when said member is shifted, a weight pivotally mounted on said arm, and a fuel valve adapted to be opened by the inertia of said weight when the arm is swung upwardly.

8. In combination with a carburetor, a swinging vane in the mixing-chamber and means connected thereto for actuating the fuel-feeding valve, said means being adapted to increase the supply of fuel momentarily only upon sudden opening of the throttle, said means embodying a swinging arm carrying a pivoted lever, and a guide or confining bar in the path of said lever and against which said lever normally bears, said guide-bar being adapted to be flexed or warped.

9. In a suction carburetor, a fuel-valve and devices for setting the same for a normal supply of fuel, a spring for holding the valve against further opening, and automatic means embodying a pressure-member for momentarily opening said valve further against the action of said spring during the initial inrush of air and causing the valve to be restored to normal without regard to the position of the pressure-member, said means embodying a swinging arm carrying a lever for actuating the valve, and a flexible guide-bar engaging said lever, for the purpose set forth.

10. In a carburetor, a vane in the mixing-chamber having a fuel-distributing chamber and adapted to normally swing down to closed position and to be opened by inrushing air, said vane having a hollow hub, a fuel-valve controlling the inlet of fuel to said hollow hub, a float-chamber connected to said hollow hub by a channel, a bleed opening x' being provided for said channel at a point above the normal level of the liquid in the float-chamber to thereby prevent siphonic action carrying fuel into the mixing-chamber after the engine is stopped.

In testimony whereof I hereunto affix my signature.

WILLIS C. HESS.