

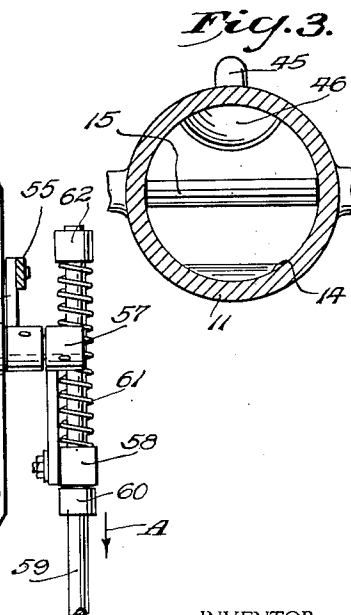
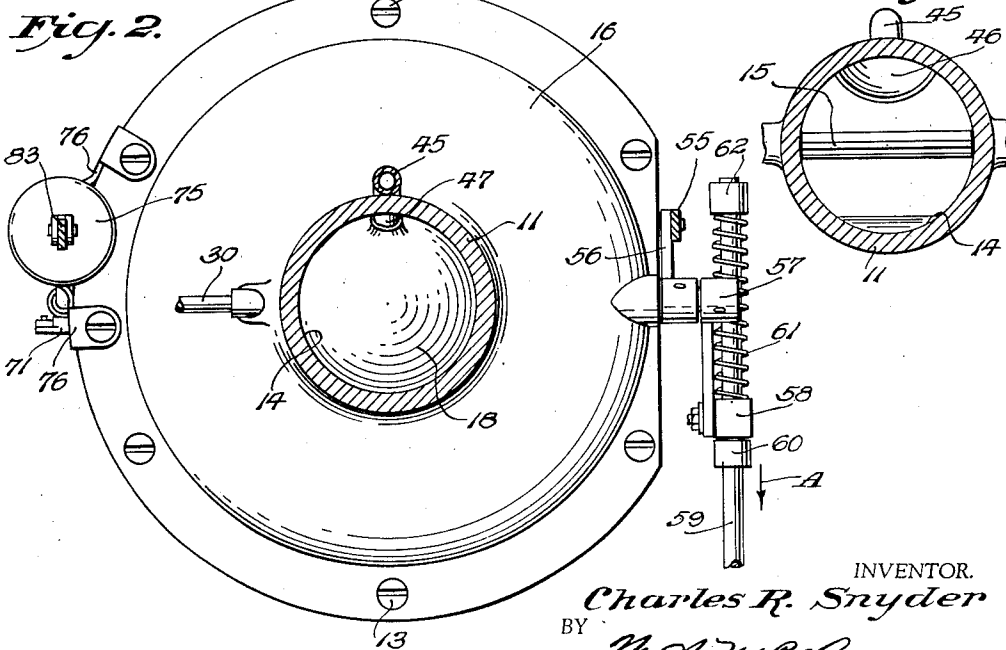
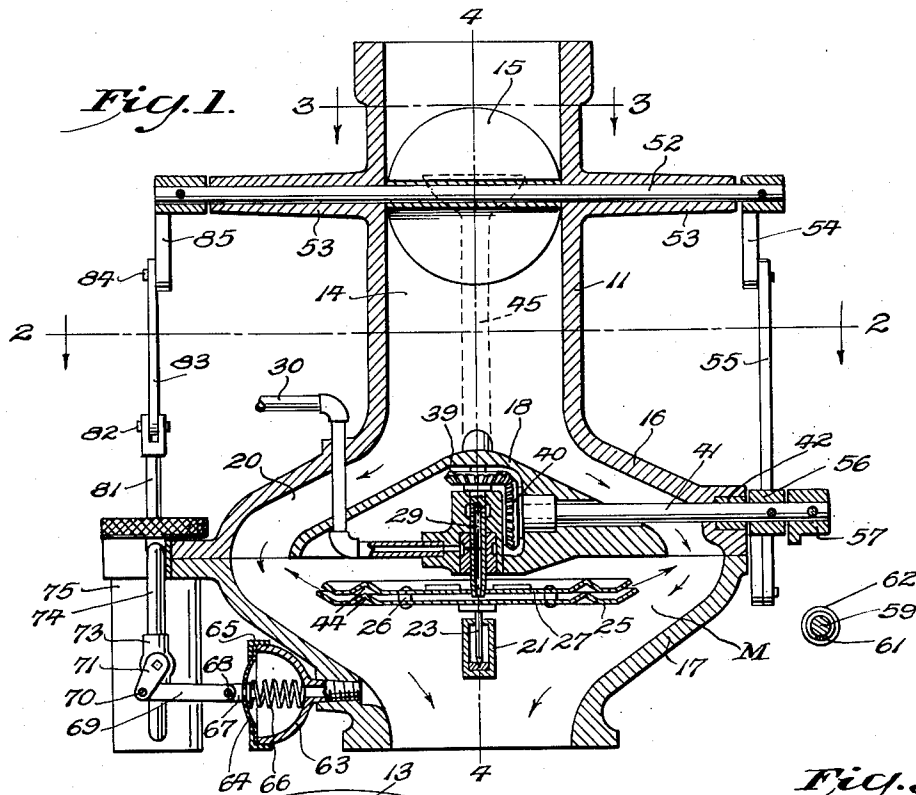
May 6, 1952

C. R. SNYDER
CARBURETOR

2,595,719

Filed May 18, 1946

3 Sheets-Sheet 1



INVENTOR.
Charles R. Snyder
BY *W. J. McLaughlin*

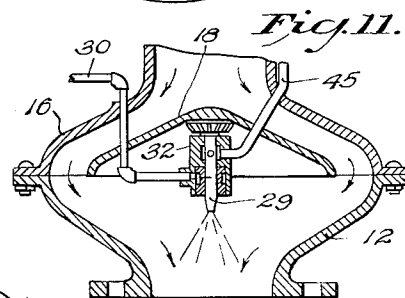
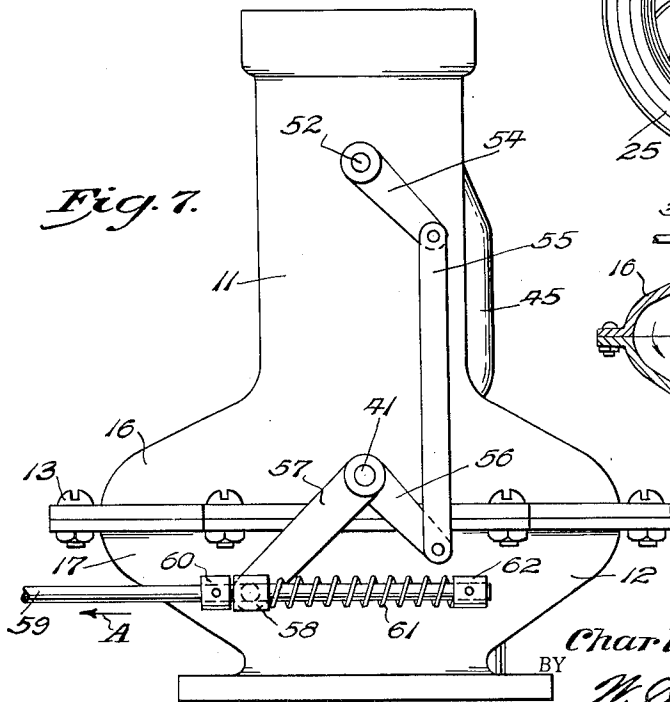
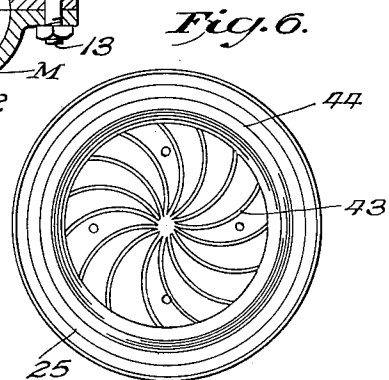
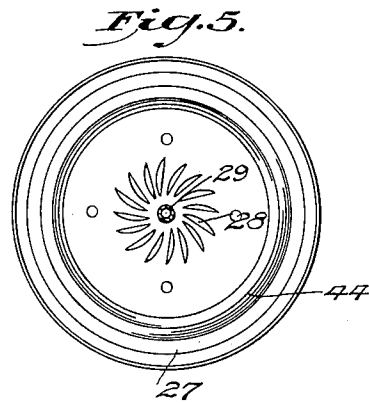
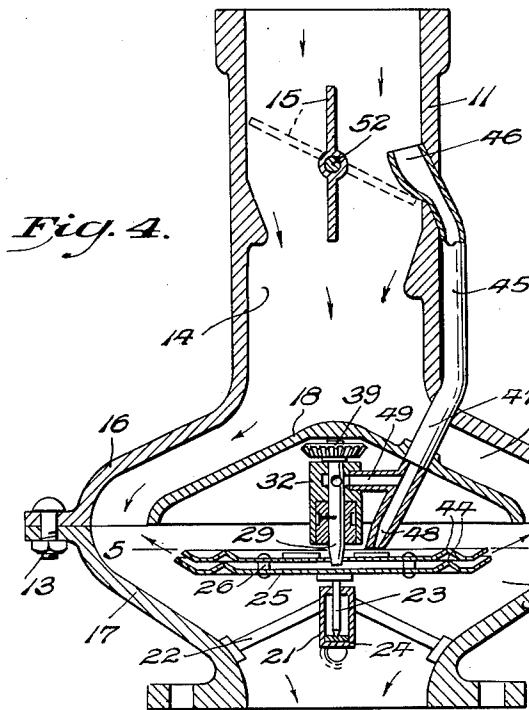
May 6, 1952

C. R. SNYDER
CARBURETOR

2,595,719

Filed May 18, 1946

3 Sheets-Sheet 2



INVENTOR.

Charles R. Snyder

BY *W. J. McDowell*

May 6, 1952

C. R. SNYDER
CARBURETOR

2,595,719

Filed May 18, 1946

3 Sheets-Sheet 3

Fig. 8.

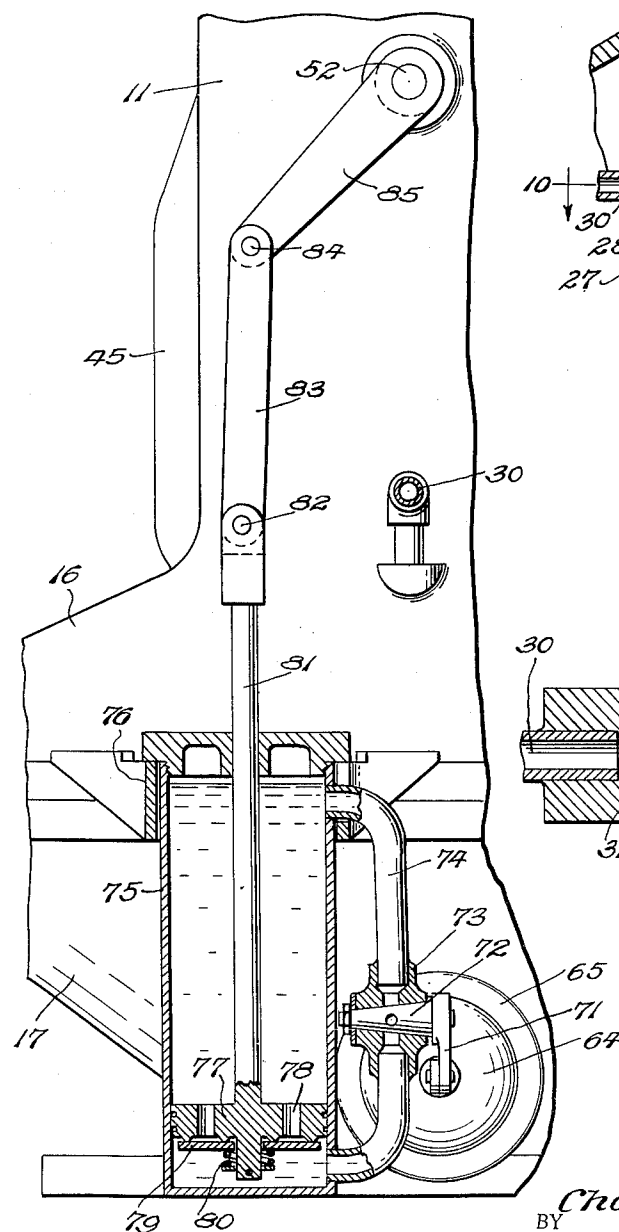


Fig. 9.

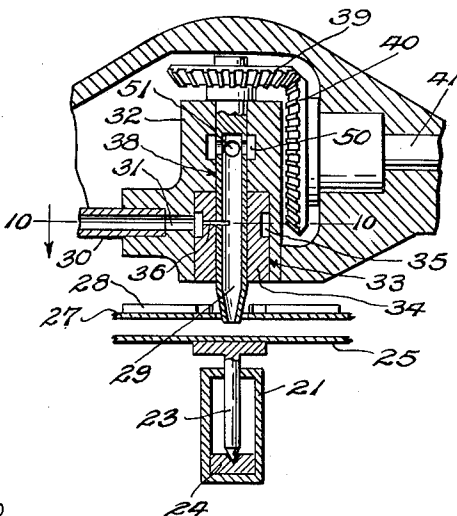
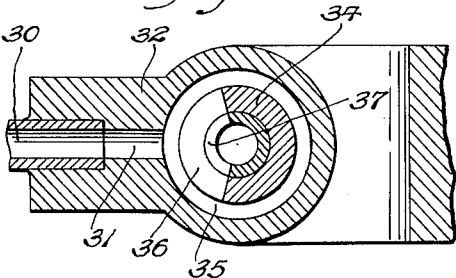


Fig. 10.



INVENTOR.
Charles R. Snyder
BY
H. D. McElwain

UNITED STATES PATENT OFFICE

2,595,719

CARBURETOR

Charles R. Snyder, Miami Beach, Fla.

Application May 18, 1946, Serial No. 670,814

5 Claims. (Cl. 261—89)

1

This invention relates to carburetors for internal combustion engines, and has for its general object to provide a carburetor of improved and simplified construction and one adapted to supply under all conditions of engine operation a properly proportioned combustible mixture of liquid fuel and air to the engine cylinders.

It is another object of the invention to provide a carburetor in which a fuel and air-admixing chamber is present having an air-admitting inlet in which is located a controlling throttle valve and a fuel inlet governed by a fuel valve, and wherein means are provided for coordinating the operation of said valves so that an economical and efficient fuel mixture will be supplied to the cylinders of the connected engine during all operating stages of the latter. By locating the air-admitting or throttle valve in the air inlet of the carburetor, the mixing chamber therein is subject to varying degrees of vacuum which, unless due compensation is made, detrimentally affects by rendering ununiform the volumetric delivery of fuel to the chamber.

Accordingly, it is a further object of my invention to provide in such a carburetor a supplemental air-delivering passage, which leads from the air inlet at a position anterior to the throttle valve therein, and at its other end communicates with the interior of the fuel valve and its associated fuel-discharging nozzle. The said passage functioning to insure a regulated delivery of fuel to the mixing chamber and nullify irregularities attributable to variable pressure conditions present in said chamber during engine operation.

A further object of the invention is to provide a carburetor of this character wherein a rotatable fuel-disintegrating disk is mounted in the mixing chamber to receive liquid fuel from the fuel-discharging nozzle, and wherein the auxiliary air conduit, which leads from the air inlet of the carburetor, terminates in a nozzle disposed in close proximity to blades or vanes provided on said disk, whereby to insure the rapid rotation of the disk under all conditions of engine operation, so that fuel will be discharged from its periphery in the form of a fine annular mist or spray and, while in such form, admixed with air passing through the carburetor for delivery to the engine cylinders.

The present invention constitutes a continuation-in-part of my prior co-pending application, Serial No. 504,731, filed October 2, 1943, which application has been abandoned.

With these and other objects in view, as will

2

appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts, hereinafter more fully described and pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a vertical sectional view taken through a carburetor constructed in accordance with the present invention;

Fig. 2 is a horizontal sectional view on a plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a similar view on the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view taken through the carburetor on the line 4—4 of Fig. 1;

Fig. 5 is a detail plan view of the turbine disk;

Fig. 6 is a similar view of the fuel-disintegrating or vaporizing disk;

Fig. 7 is a front elevational view of the carburetor;

Fig. 8 is a fragmentary rear elevational view of the carburetor disclosing the fuel-flow regulating cylinder in vertical cross section;

Fig. 9 is a detail vertical sectional view taken through the rotary fuel-admitting valve of the carburetor;

Fig. 10 is a detail horizontal sectional view on the line 10—10 of Fig. 9;

Fig. 11 is a detail vertical sectional view disclosing a modified form of my improved carburetor.

Referring more particularly to the drawings, which form a part of this specification, and in which similar characters of reference denote like and corresponding parts throughout the several views thereof, my improved carburetor, in the specific embodiment thereof herein shown, comprises a casing embodying an upper section 11 and a lower section 12, the same having their adjoining edges provided with registering flanges which are adapted to be suitably and detachably united by means of the threaded fastening elements 13. The upper section includes an elongated conduit 14 in which is pivotally mounted a conventional throttle or air-flow regulating valve 15, the latter being adapted to assume various air flow-regulating positions within the conduit through the use of manual controls, hereinafter more fully defined. The bottom of the upper section terminates in an enlarged bell-shaped portion 16, which is complementary to a similarly enlarged portion 17 formed on the lower section 12.

Within the bell portion 16 of the upper section 11, there is axially arranged a stationary

mounted air flow-deflecting baffle 18, the latter being so disposed that the surfaces thereof are spaced from the adjacent wall surfaces of the bell portion 16 to form an annular air passageway 20.

The lower section 12 has arranged axially therein a bearing housing 21, which is supported by spider-arms 22 from the outer walls of the section 12. The housing 21 effects the rotatable support of a small diametered spindle 23. The latter may have a needle-like lower end adapted to rest on a wear-resisting hardened contact member 24, so that the spindle may rotate at high speeds and lubrication thereof minimized.

The upper end of the spindle is connected axially with the lower side of a fuel disseminating, vaporizing or atomizing disk 25, which is arranged for rotation in a horizontal plane below the air-deflecting baffle 18. Connected with the disk 25 by means of pin and spacer elements 26 is a complementary turbine disk 27. This disk is arranged immediately over and in parallel relation with the disk 25, both disks possessing approximately the same diameter. The upper surface of the turbine disk 27 is formed with radially disposed blades or vanes 28, which preferably occupy the central region of the disk 27 in order to increase the rotational speed of the latter. A jet of air moving under high velocity is adapted to impinge the blades or vanes 28 in order to effect rotation of both the disks during the operation of the carburetor.

The center of the disk 27 is formed with an opening through which projects the lower open end of a downwardly directed fuel inlet nozzle 29. This nozzle communicates with a fuel-advancing conduit 30 which leads to a source of fuel supply, such as a fuel tank or pump, not shown, so that the fuel under regulated flow may be delivered to the nozzle.

In order to regulate this flow of fuel, the conduit 30 terminates in a bore 31 provided in a stationary head 32 carried by the under part of the baffle 18. The head 32 is formed with a socket 33 in which is received a sleeve 34. Externally, this sleeve is formed with an annular groove 35 for the circulation of liquid fuel discharged from the bore 31, and the groove 35 communicates with a thin arcuate slot 36 also formed in said sleeve. Adapted to be brought into registration with the slot 36 is a corresponding slot 37 formed in the nozzle 29, the latter being rotatably supported in the sleeve 34 and in a registering vertical bore 38 provided in the head 32. The upper end of the nozzle, where it projects above the upper surface of the head 32, has secured thereto a bevel gear 39, the teeth of the latter meshing with a correspondingly formed gear 40 carried by the outer end of a horizontally extending shaft 41. This shaft is journaled in openings provided in the baffle 18 and the outer wall of the carburetor casing, there being a packing gland provided at 42.

It will be seen that when the shaft 41 is rotated, corresponding rotation will be imparted to the nozzle 29 so that the slots 36 and 37 may be brought into various degrees of registration, or completely moved out of registration, whereby to control the amount of fuel flowing from the conduit system 30 into the carburetor. Any fuel so admitted is deposited on the upper surface of the disk 25 and, through the rotation of the latter, is discharged centrifugally from the periphery of said disk in the form of discrete particles of a finely divided, fog-like nature.

Air advances through the air inlet provided in the conduit 14 of the carburetor, moving past the throttle valve 15 when the latter is open and thence through the passageway 20 into the mixing chamber M of the carburetor, where the air is intimately admixed with the mist-like fuel particles discharged from the periphery of the disk 25, such fuel particles being thrown horizontally into the mixing chamber through the rotation of the disk assembly. The finely divided fuel particles are readily caught up by the air stream and efficiently disseminated therethrough to produce a highly combustible fuel mixture.

If desired, the upper surface of the disk 25, as shown in Fig. 6, may be provided with a plurality of slightly raised spiral ribs 43, which have the function of equally distributing the fuel delivered axially to the disk over its upper surface and effecting positive advance of such fuel, in addition to centrifugal force, toward the peripheral edge of the disk. I have found that the function of the disk, in disseminating finely divided fuel particles from its full circumference, is improved by providing each of the disks 25 and 27 with registering and upstanding annular ribs 44. Also, the outer portions of the disk are inclined upwardly at a slight angle to the horizontal, in order that the released fuel particles will be forced against the counter-moving air stream, thus arresting progress of the released fuel and effecting its intimate union with the air stream moving in a down-draft direction.

To effect the rotation of the disk assembly, use is made of an air conveying tube 45, the open upper end of which terminates in the air inlet of the carburetor above but adjacent to the throttle valve 15, the open upper end of the tube being in the form of a scoop, such as is indicated at 46. The intermediate portion of the tube 45 is disposed exteriorly of the casing walls and terminates in an inwardly and downwardly directed extension 47, passing through the walls 16 and 18 and terminating in a nozzle 48 which is disposed immediately over the vanes or blades 28 of the turbine disk. Also, the extension 47 is formed with a lateral branch 49 which extends into a bore provided in the head 32 and terminates in registration with an annular groove 50 formed in said head around the rotary fuel inlet valve 29. In registration with the groove 50, the inlet valve 29 is formed with a plurality of ports 51 by means of which the interior of the valve 29 is vented to the atmosphere to prevent any stoppage of fuel flow to the nozzle at the lower end of the valve 29.

To coordinate the operation of the throttle valve 15 with that of the fuel valve 29, the said throttle valve is fixed on a shaft 52, journaled as at 53, in connection with the walls of the conduit 14. At one end, the shaft 52, as shown in Fig. 7 carries a crank arm 54, and pivotally connected to the outer end of this crank arm is the upper end of a link 55, the lower end of said link being pivotally connected to a second crank arm 56 which is carried by and extends from the outer end of the shaft 41 employed in operating the fuel inlet valve. Another crank arm 57 is also pinned to the outer end of the shaft 41, and at its lower or outer end, the crank arm 57 carries a swiveled block 58. This block is formed with a longitudinal bore in which is slidably received a manually movable rod 59, the latter being adapted for actuation by the employment of the usual accelerator control, not shown, of a motor vehicle. Carried by the rod 59 is a fixed collar

60, which is disposed in contact with the block 53. Engaging with the other side of the block 53, as regards the collar 60, is one end of a coil spring 61, the latter surrounding the rod 59 and being positioned between the block 53 and a second collar 62 fixed on the rod 59 at its outer end.

It will be manifest that when the rod 59 is moved normally, the crank arm 57 is rocked, thus rocking the shaft 41 and actuating the fuel inlet valve. The rocking motion of the shaft 41 is transferred to the throttle valve by means of the crank arms 54 and 56 and the link 55, so that as the fuel inlet valve is open to admit of the inflow of greater amounts of fuel, a corresponding adjustment in position takes place on the part of the throttle valve so that a proportionately increasing supply of air is admitted into the carburetor for admixture therewith.

In order to compensate for a condition in which the working load on the engine is severe and the accelerator control operated to completely open the throttle valve and also to open the fuel valve to its maximum extent, so that the resulting mixture is overly-loaded with the fuel constituents, the present invention provides an arrangement somewhat similar to that disclosed in applicant's prior Patent No. 2,327,675. In this arrangement the lower part of the carburetor is formed with a threaded opening in which is received the hollow stem of a diaphragm casing disclosed at 63. The outer side of this casing is closed by a flexible diaphragm 64, which is held in place by a clamping ring 65 threaded on the casing. A coil spring 66 is arranged axially within the casing 63 and presses outwardly on the center of the diaphragm 64.

The center of the diaphragm is provided with an outwardly projecting stud 67 to which is pivoted, as at 68, one end of a link 69, the opposite end of said link being pivotally connected as at 70 with a valve-actuating arm 71. As shown in Fig. 8, the arm 71 is connected with a rotary valve plug 72 mounted in the tapered socket of a valve casing 73. This casing is arranged in a pipe line 74 which extends on one side of the valve to the upper end of a control cylinder 75 and the lower end of the pipe line leads to the corresponding end of said cylinder, the latter being suitably supported as at 76 on the carburetor casing.

Slidably mounted in the cylinder 75 is a piston 77 having ports 78. These ports are normally closed by means of a disk valve 79 which is pressed by a spring 80. Extending upwardly from the piston is a piston rod 81 which extends through the top of the cylinder and is pivotally connected as at 82 to the lower end of a link 83, the upper end of said link being pivoted as at 84 to the outer end of a crank arm 85 fixed on the end of the shaft 52 opposite to the crank arm 54.

By this arrangement, it will be seen that when the accelerator control rod is advanced in the direction indicated by the arrow A in Figs. 2 and 7, the crank arms 54 and 57 will be actuated by the spring 61 to move the crank arm 54 downwardly and to swing the crank arm 57 to the full line position indicated in Fig. 7, thus simultaneously opening the air and fuel valves. If, however, the engine is laboring at a slow speed, and the operator of the vehicle should press down fully on the accelerator control, the fuel supply valve is retarded in its opening operation. This is accomplished by the fact that when the air valve is fully opened, with the engine operating slowly under load conditions, the partial vacuum

normally present in the mixing chamber of the carburetor is removed, so that the diaphragm 64 flexes outwardly under the influence of the coil spring 66. This closes the valve 72, arresting fluid circulation through the pipe line 74, and prevents displacement of the liquid contained in the cylinder 75, so that the piston therein is locked against movement, thus preventing the oscillation of the air valve shaft 52 and the fuel valve shaft 41, the energy applied to the accelerator pedal to actuate the rod 59 being absorbed by the compression of the spring 61.

As the engine picks up speed, as a result of a change in ratio in the gear transmission, or other lightening of the load on the engine, so that the partial vacuum in the mixing chamber is increased, the diaphragm 64 is drawn inwardly, operating the valve 72 to permit of the by-passing of liquid from one end of the cylinder 75 to the other, the energy present in the compressed spring 61 serving to operate the air and fuel valve controls automatically as the same need to be opened to correspond with the increasing speed of the engine as a result of a load lightened thereon.

It will thus be seen that I have provided a carburetor of simplified and improved design. The tubular fuel jets of the average carburetor are not employed, nor are float valves and other similar delicate parts. The only moving part within the carburetor casing is the rotating disk assembly and the construction of this unit is such as to provide long life with minimum care or attention. The spinning of the disk is accomplished by a confined flow of air obtained from the air inlet of the carburetor, and since the air is directed on the disk assembly adjacent to its center of rotation, the same attains a high rotational speed suitable for the disseminating of fuel from its peripheral edges in the form of a fine mist. Even flow of the liquid fuel is established by venting the fuel valve to the atmosphere through the branch 49. The ports 51 in the upper end of the fuel valve and the groove 50 possess a greater cross sectional area than that of the lower nozzle end of the fuel valve, a condition which results in a positive flow of the fuel without stoppage resulting from vacuum conditions. The fuel is also metered by being operated in conjunction with the air throttle valve, together with the compensating relief provided by the diaphragm 64 and cylinder 75 in preventing flooding.

Thus the present invention provides a carburetor in which the air-admitting or throttle valve is located in its air inlet. By being so located, and as the manually actuated throttle valve assumes different operating positions, various degrees of vacuum will be created in the mixing chamber. By the provision of the supplemental or auxiliary air conduit, which leads from the air inlet of the carburetor beyond the throttle valve, air flow at all times will be established in said supplemental conduit to cause a regulated or metered flow of liquid fuel to the mixing chamber. Also, the supplemental air conduit is utilized to produce rotation of the fuel-disintegrating disk so that its action will be positive and reliable throughout all stages of engine operation.

While I prefer to employ the rotating disk, nevertheless, in a simple form of my carburetor, as shown in Fig. 11, the said disk is omitted and the fuel advanced directly into the mixing chamber under positive flow conditions for admixture with the air stream, the fuel being atomized on

its discharge from the fuel nozzle for injection into the air stream passing through the mixing chamber of the carburetor.

I claim:

1. In a carburetor, a hollow casing providing in series an air inlet passage, an enlarged annular mixing chamber, and an outlet for carbureted fuel; a throttle valve in said inlet passage; a stationary generally conical baffle spaced concentrically within said mixing chamber with the base of the cone directed toward said carbureted fuel outlet, the space within said casing from said throttle valve to the base of the cone of said baffle being substantially open and uninterrupted, whereby air flowing inwardly past said throttle valve passes around said baffle in a substantially continuous tubular flow; a vaned centrifugal fuel disseminator mounted within said mixing chamber for rotation in a plane transverse to said casing, said disseminator being located between said baffle and said outlet passage in a position to be surrounded by the tubular flow of air from said baffle; manually controlled means for feeding liquid to said disseminator, and a conduit of restricted cross-sectional area for receiving air from a portion of said inlet passage anterior to said throttle valve and directing air against the vanes of said disseminator to rotate the disseminator, said conduit being located wholly outside of the area of said inlet passage between said throttle and said baffle.

2. In a carburetor, a hollow casing providing in series an air inlet passage, an enlarged annular mixing chamber, and an outlet for carbureted fuel; a throttle valve in said inlet passage; a generally conical air flow directing baffle mounted concentrically within said mixing chamber with the apex of the cone directed toward said inlet passage, the space within said casing from said throttle valve to the base of said conical baffle being substantially uninterrupted, whereby air flowing inwardly past said throttle valve passes around said baffle in a substantially continuous tubular path; a centrifugal fuel disseminator mounted within said mixing chamber for rotation about the longitudinal axis of said baffle, said fuel disseminator comprising a pair of closely spaced plates positioned parallel with and closely adjacent to the base of said conical baffle, one of said plates being provided with turbine vanes; a conduit of reduced cross-sectional area arranged to receive air from said inlet passage at a point anterior to said throttle valve and to direct air against said vanes to rotate said fuel disseminator, said conduit being located wholly outside of that portion of the inlet passage between said throttle valve and said baffle, and means for feeding liquid fuel to said centrifugal disseminator.

3. In a carburetor, a hollow casing providing in series an air inlet passage, a mixing chamber, and an outlet for carbureted fuel, a throttle valve in said inlet passage, a vaned centrifugal fuel disseminator mounted for rotation within said mixing chamber, a vaned turbine mounted for rotation in said chamber in unison with and immediately adjacent to said disseminator, conduit

means including a manually operated control valve for supplying liquid fuel to the center of said disseminator, a by-pass conduit of restricted cross-sectional area arranged to receive air from said inlet passage at a point anterior to said throttle valve and to discharge jetted air directly against the vanes of said turbine, whereby to effect joint rotation of said turbine and fuel disseminator, and passage means communicating between said by-pass conduit and the outlet side of said manually operated control valve, whereby incoming air free from effects of changing pressure conditions in said mixing chamber is employed both to rotate said turbine and centrifugal disseminator and to aid in feeding liquid fuel to the disseminator.

4. In a carburetor, a casing having a passage extending longitudinally therethrough, said passage providing an air inlet at one end thereof, an air outlet at its other end, and an enlarged intermediately arranged fuel-mixing chamber, a stationary web in the chamber of said passage, said web being spaced in part from the walls of said chamber to provide air flow through the chamber and past said web, a throttle valve in the air inlet end of said passage, conduit means extending through and terminating in the center of said web, a manually operated control valve for regulating liquid fuel flow through said conduit means and the conjoint operation of said throttle valve, a vaned centrifugal fuel disseminator mounted for rotation within said mixing chamber beneath said web with the center of said disseminator in registry with the terminating end of said conduit means to receive directly fuel therefrom, a vaned turbine mounted for rotation in said chamber in unison with and immediately adjacent to said disseminator, and by-pass conduit means of restricted cross-sectional area arranged to receive air from the air inlet end of said passage at a point anterior to said throttle valve and to discharge jetted air directly against the vanes of said turbine whereby to effect joint rotation of said turbine and fuel disseminator.

5. In a carburetor of the character defined in claim 4 and wherein said passage at one side of said web and fuel disseminator is provided with a stationary generally conical air flow directing baffle spaced concentrically within said mixing chamber with the apex of the cone directed toward the fuel outlet end of said passage.

CHARLES R. SNYDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,285,339	Ogden	Nov. 19, 1918
1,636,187	Kessel	July 19, 1927
2,150,296	Spencer	Mar. 14, 1939
2,186,829	Haddock	Jan. 9, 1940
2,225,804	Spencer	Dec. 24, 1940
2,238,333	McCain	Apr. 15, 1941
2,327,675	Snyder	Aug. 24, 1943
2,343,815	Snyder	Mar. 7, 1944