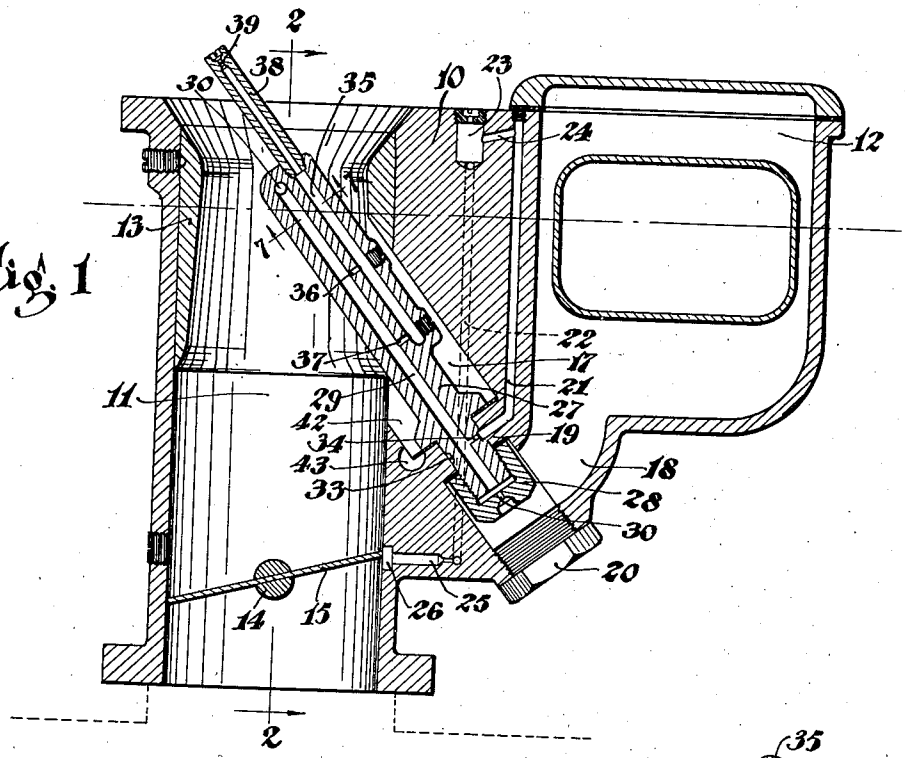
Oct. 9, 1934. F. C. MOCK 1,976,452

CARBURETOR

Filed March 21, 1930 2 Sheets-Sheet 1

Fig. 1



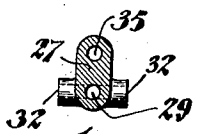
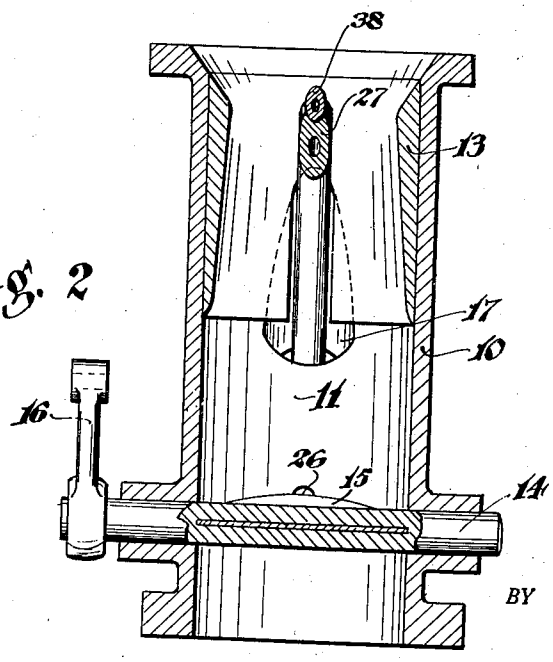


Fig. 7

Fig. 2



INVENTOR.
Frank C. Mock
BY
W. W. McConkey
ATTORNEY

Oct. 9, 1934. F. C. MOCK 1,976,452

CARBURETOR

Filed March 21, 1930 2 Sheets-Sheet 2

Fig. 3

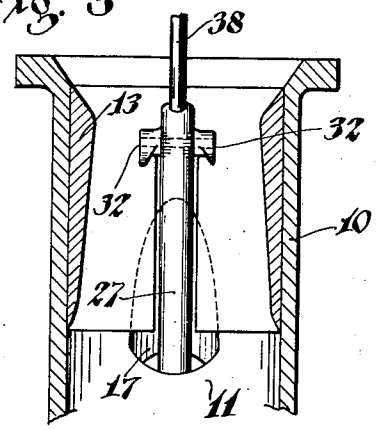


Fig. 4

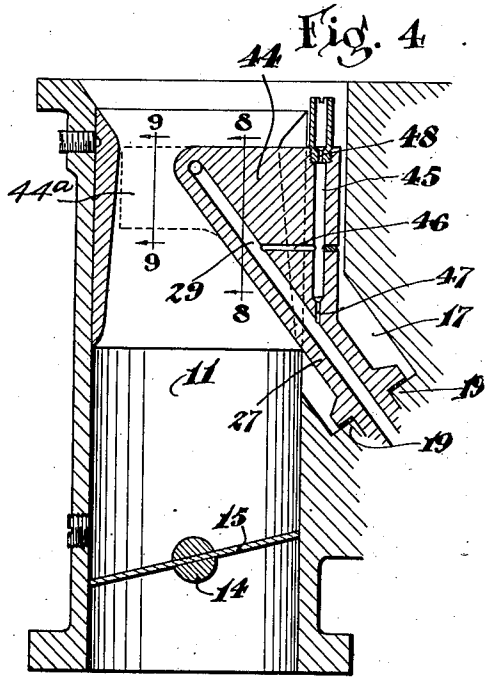
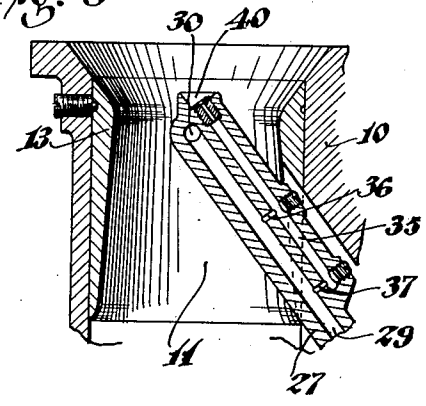


Fig. 5



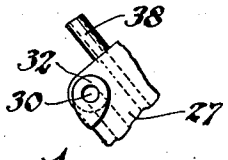


Fig. 6

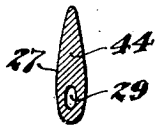


Fig. 8

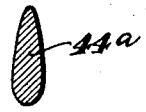


Fig. 9

INVENTOR.
Frank C. Mock
BY Dr. W. McConkey
ATTORNEY

Patented Oct. 9, 1934 1,976,452

UNITED STATES PATENT OFFICE

1,976,452

CARBURETOR

Frank C. Mock, Chicago, Ill., assignor to Bendix Stromberg Carburetor Company, South Bend, Ind., a corporation of Illinois

Application March 21, 1930, Serial No. 437,635

10 Claims. (Cl. 261—41)

This invention relates to carburetors and more particularly to down-draft carburetors.

In the design of down-draft carburetors, particularly of the type employing an air-bled main jet and an idling jet beyond the throttle, considerable difficulty has been experienced in obtaining prompt and proper delivery of fuel into the air stream of the mixing chamber.

In some forms previously used, the main nozzle structure has been set off to one side of the air passage with a cross channel to the middle thereof: when the engine is idling the fuel in the main jet stands below the level of this cross passage, with the result that it has a relatively long distance to travel before it can get out into the air stream, when the throttle is opened from idling and feed from the main jet is desired.

In other forms of down-draft carburetors, the main jet structure, including an idling feed take-off and air bleed channels, has been located in the air passage, but here it obstructs the air flow seriously and interferes with the spray distribution. I have found by experiment that any projection into the air flow creates an eddy on the down-stream side thereof and whenever fuel spray escapes adjacent to such a projection, it is drawn into the eddy and out of the air stream. This is particularly detrimental when the outlet of the carburetor is close to a point of division of the intake manifold, as lack of symmetry in the air stream, or in the distribution of the fuel spray through the air stream, usually results in unequal mixture strengths for the different manifold leads.

Another difficulty experienced with down-draft carburetors is that when the fuel is fed by gravity and the float mechanism fails to shut off tightly when the engine is not running, the level in the float chamber rises and fuel escapes from the jet into the engine. This condition, of course, does not obtain when the fuel is fed from below by an engine operated pump.

Another draw-back experienced with different forms of jets in down-draft carburetors is that at low suctions, the fuel does not spurt from the jet but trickles out and tends to run down the side of the jet, thereby getting out of the center of the air stream.

One of the objects of this invention is to provide means for insuring delivery of fuel into the center of the air stream in the mixing chamber.

Another object of the invention is to provide a main jet structure in which the fuel, during idling, lies near the jet outlet, so that the engine will respond promptly to a quick throttle opening.

Another object of the invention is to provide a main fuel nozzle offering the minimum resistance to air flow in the mixing chamber.

Another object of the invention is to provide means for preventing an eddy in the air flow on the down stream side of a main fuel jet.

A further object of the invention is to provide means for preventing the escape of fuel from the main fuel nozzle into an engine.

A further object of the invention is to provide a main fuel nozzle having a bleed opening against the direction of air flow.

A further object of the invention is to provide a carburetor having means for directing the air stream in the mixing chamber centrally and systematically.

Yet a further object of the invention is to provide a carburetor which has the advantages of positive action, is highly efficient in operation, and yet of marked simplicity as a whole in respect to each of its component parts so that its manufacture may be economically facilitated both as regards parts and their assembly.

Other objects of the invention will appear from the following description taken in connection with the drawings which form a part of this specification, and in which:

Figure 1 is a vertical sectional view of a carburetor embodying the invention;

Figure 2 is a sectional view on line 2—2, Figure 1;

Figure 3 is a fragmentary sectional view along the same line as Figure 2, but showing the jet in elevation;

Figure 4 is a vertical sectional view of a mixing chamber having positioned therein a main fuel nozzle illustrating a modified form of the invention;

Figure 5 is an enlarged sectional view illustrating a modification of the main fuel jet and air bleed therefor;

Figure 6 is a fragmentary view showing a part of the jet in side elevation;

Figure 7 is a detail sectional view substantially on line 7—7, Figure 1;

Figure 8 is a section on line 8—8 of Figure 4; and

Figure 9 is a section on line 9—9 of Figure 4.

Referring to the drawings for more specific details of the invention, 10 represents the body of the carburetor structure having positioned therein a mixing chamber 11 and a float chamber 12. As shown, a Venturi tube 13 is positioned at the upper end of the carbureting chamber and passing diametrically through the chamber below the

Venturi tube is a shaft 14. This shaft is mounted for rotation in the wall forming the chamber and is provided with a diametral slot in which is secured a throttle valve 15. This valve is operated through a lever 16 secured on one end of the shaft.

Positioned in the wall of the body structure between the mixing chamber and the float chamber is a bore 17 opening into the mixing chamber through a portion of the Venturi tube and extending obliquely from the mixing chamber to the wall of the body structure below the float chamber and communicating therewith by a passage 18 leading from the bottom of the float chamber. This bore has formed therein an annular shoulder 19 adapted to support a fuel nozzle, to be hereinafter described, and a clean out plug 20 is threaded in the lower end of the bore.

Positioned in the wall of the body structure between the mixing chamber and the float chamber is an idle passage 21. This passage is arranged in parallel relation to the mixing chamber and communicates with the bore 17 through the annular shoulder 19 and arranged in spaced relation to the idle passage is an idle bleed 22. The upper end of the idle bleed is slightly increased in diameter to provide a chamber 23 which is connected by a passage 24 to the idle passage 21 and the lower end of the idle bleed is connected by a passage 25 with the mixing chamber. The passage 25 is so arranged and provided with an enlarged discharge opening 26 that when the throttle valve is in a closed position the discharge opening 26 straddles the periphery of the throttle valve.

Mounted in the bore 17 on the annular shoulder 19 is a main fuel nozzle 27 secured in position by a nut 28 threaded on the lower end of the nozzle and bearing against the annular shoulder. The main fuel nozzle has the conventional axial passage 29, the lower end of which communicates through a metering orifice 30 in the nut 28 with the passage leading from the bottom of the float chamber, and the upper end of the passage 29 communicates with a transverse passage 30 extending through oppositely disposed bosses on the nozzle to provide corresponding and oppositely disposed jets 32 positioned centrally in the air stream.

Arranged around the nozzle near its base is a groove which together with the annular shoulder 19 provides a passage 33 registering with the idle passage 21 and communicating through the orifice 34 with the main fuel nozzle passage. The main fuel nozzle also has positioned therein parallel to the passage 29 an air bleed 35. This bleed communicates with the nozzle passage 29 through orifices 36 and 37 arranged in spaced relation. Secured in the upper end of the passage or bleed 35 is a tube 38 having in the inlet end thereof a metering orifice 39. As shown, the inlet end of the bleed 35 is extended so that air is drawn before entering the Venturi tube to obtain substantially atmospheric pressure. As shown in Figure 5, substantially the same effect may be obtained by locating the air bleed opening in a cup 40 formed in the fuel nozzle and positioned in the Venturi air passage with the rim of the cup against the direction of air flow.

When an engine to which a carburetor is attached is idling, the fuel delivery is through the idling jet only and the main fuel jet level is slightly below the level in the float chamber. For prompt response of the engine to a quick throttle opening the space between the fuel level in the main fuel jet and the jet outlet should be as small as possible. It will be observed that in the present structure the space has been reduced to a minimum.

It is highly desirable that the jet structure should occupy a minimum space and offer the minimum resistance to air flow. This is equally true with respect to the nozzle, hence the general shapes or contours of the jet and the nozzle are stream line shapes conforming to the air flow. This feature is clearly shown in Figures 6 and 7.

I have also found that every projection into the air flow creates an eddy on its down-stream side and as the fuel spray escapes adjacent to a projection it is drawn into the eddy and out of the center of the air stream: hence, I have provided jets 32 arranged to project the spray beyond the influence of the eddy. Also, at low suctions, to prevent the fuel from trickling back along the jet body and down the inside of the mixing chamber, I have arranged small extensions or lips on the discharge ends of the jets, as clearly shown in Figures 3 and 6, so that the fuel will drop off into the air stream. When these lips are provided, pocket 42 and drain 43 are not needed, the fuel preferably being fed to the carburetor by an engine operated pump.

It will be observed that the nozzle 27 is positioned in the bore 17 on the shoulder 19 to form a pocket or chamber 42 surrounding the base of the nozzle. The chamber 42 is provided with a drain outlet 43. This structure is found desirable in instances where fuel is fed to the carburetor by gravity. In such instances as the float mechanism does not shut off tightly when the engine has stopped, the level in the float chamber will rise and fuel will escape from the jet and run down into the engine. In the above described structure, the fuel trickles down the nozzle and into the pocket or chamber 42 and is drained therefrom through the outlet 43. This structure has been found especially desirable in airplane engines.

Figures 4 and 8 illustrate a modified form of the invention. In this modification, the nozzle is provided with a web 44 of stream line shape, as shown in Figure 8, to conform to the air flow. This web has an air bleed 45 positioned therein and connected to the fuel passage by small passages 46 and 47 and the bleed 45 is provided with a metering orifice 48 opening above the Venturi tube. In some instances in order to reduce air turbulence, it has been found desirable to extend the web 44 entirely across the Venturi tube as shown in broken lines at 44^a in Figures 4 and 9, particularly where there are a plurality of manifold leads close to the outlet of the carburetor.

It is important that the air stream should be directed centrally and systematically to the center of each passage and this may be obtained by extending the web substantially as shown and described. It is, of course, to be understood that such a web may be incorporated in any embodiment of my invention.

While the preferred embodiments of the invention have been described, it is to be understood that these are given merely as examples of the underlying principles of the invention and since these may be incorporated in other specific mechanical structures, I do not intend to be limited to those shown except as such limitations are clearly imposed by the appended claims.

I claim:

1. A carburetor comprising a mixing chamber, a fuel drip pocket in the wall thereof, a drain for said pocket and a main fuel nozzle positioned

in the pocket and projecting upwardly therefrom in spaced relation to the pocket side walls.

2. A carburetor comprising a mixing chamber, a fuel drip pocket in the wall thereof, a drain for said pocket and a main fuel nozzle positioned in the pocket and extending upwardly and obliquely into the chamber.

3. A carburetor comprising a mixing chamber, a pocket positioned in the wall thereof, a drain for said pocket, a main fuel nozzle seated in said pocket and extending obliquely into said chamber and an air bleed for said nozzle opening above the intake of said chamber.

4. A carburetor comprising a mixing chamber, a Venturi tube secured in the intake of the chamber, a pocket in the wall of the chamber, a drain for said pocket, a fuel nozzle positioned in the pocket and extending obliquely therefrom into the chamber, jets on the nozzle positioned centrally in the throat of the Venturi tube and adapted to discharge in opposite directions and a bleed for the nozzle opening above the Venturi tube.

5. A down draft carburetor comprising a mixing chamber and an upwardly extending jet supported therein, having a dependent lip.

6. A down draft carburetor comprising a mixing chamber and a fuel nozzle extending upwardly therein and having oppositely disposed fuel jets each provided with a dependent lip to prevent fuel flowing down the outer surface of the nozzle.

7. In a down draft carburetor having an air passage and a venturi therein, a fuel chamber, a nozzle communicating with said chamber and projecting into the venturi, said nozzle having a fuel passage and an air passage therein and openings establishing communication between said passages, fuel discharge elements projecting from the nozzle at opposite sides thereof and extending beyond the body of the nozzle, said elements having direct communication with the fuel passage of the nozzle, and an air bleed member establishing communication between the air passage of the nozzle and the air passage of the carburetor above the venturi.

8. In a down draft carburetor, a body section having a main air passage therethrough, a fuel chamber, a venturi secured in said passage, the body section being provided with an opening into the air passage disposed at an upward and inward inclination thereto, a fuel nozzle secured in said opening and projecting upwardly therefrom into the venturi, said nozzle having a fuel passage communicating with the fuel chamber and an air passage communicating with said fuel passage, fuel discharge members communicating with the fuel passage of the nozzle and projecting laterally beyond the body of the nozzle, and an air bleed member establishing communication between the air passage of the nozzle and the main air passage above the venturi.

9. In a down draft carburetor, the combination with an induction passage of a fuel jet having a fuel passage and an air passage communicating therewith, both passages extending lengthwise of the jet, said air passage having an intake pipe mounted on the jet with its orifice projecting into said induction passage upstream from the jet.

10. In a carburetor, a fuel chamber, a body portion having an air passage therethrough, a venturi in said air passage, a fuel discharge element located in the restricted zone of said venturi, a fuel passage leading from the fuel chamber extending upwardly and inwardly within the venturi and terminating in said discharge element, said discharge element being formed with horizontally extending outlet openings supplied from said fuel passage and with projecting lips adjacent said outlet openings.

FRANK C. MOCK.