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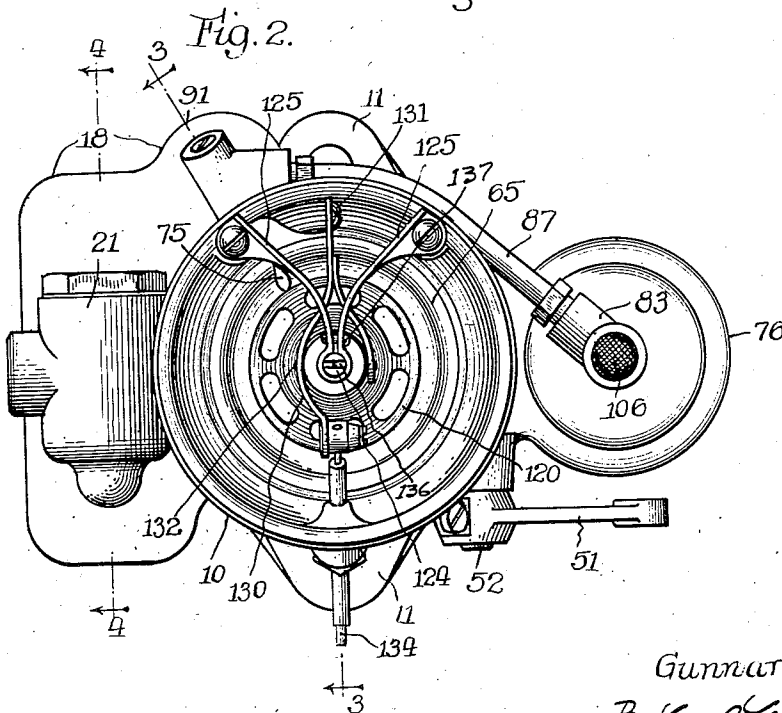
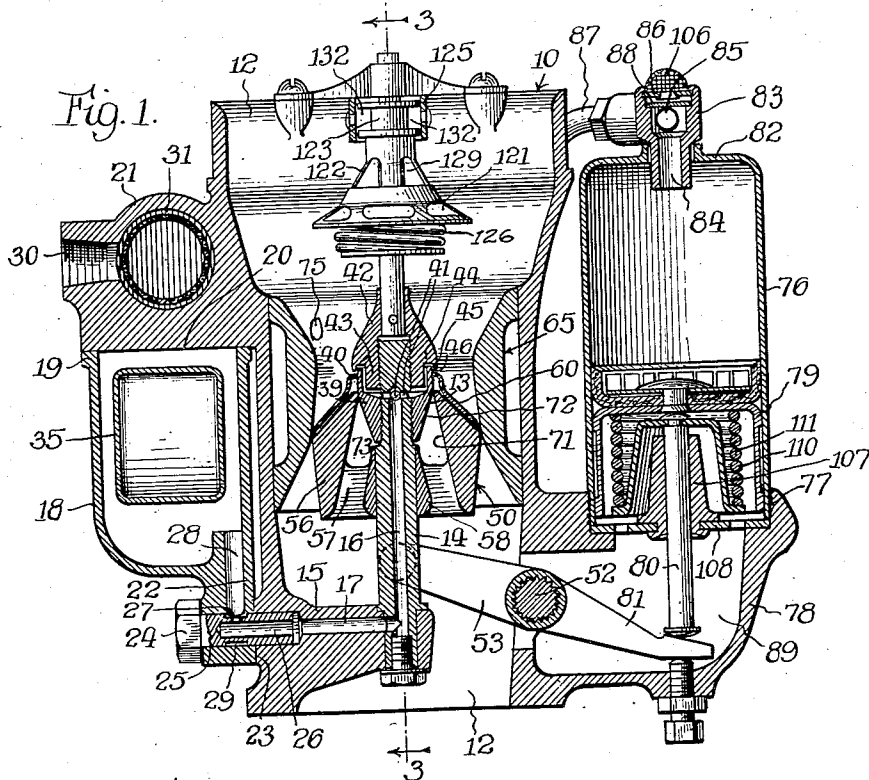
G. A. WAHLMARK

1,979,918

CARBURETOR

Filed April 30, 1931

2 Sheets-Sheet 1



Inventor:
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By Elmer C. Hoffman, Attorney.

Nov. 6, 1934.

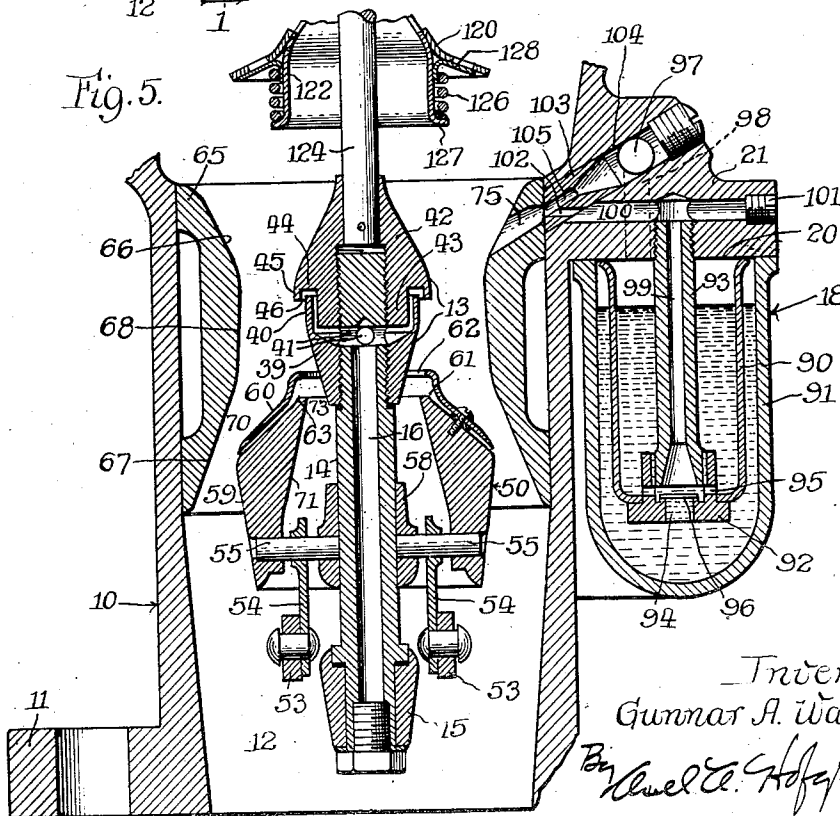
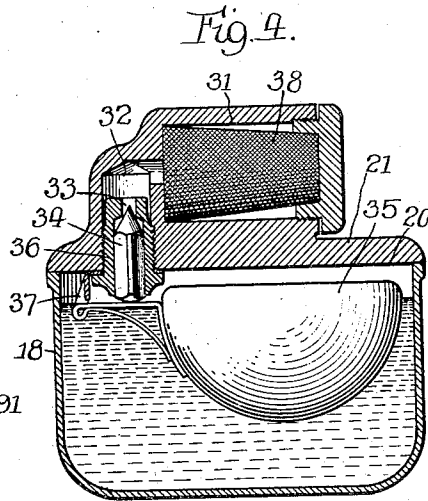
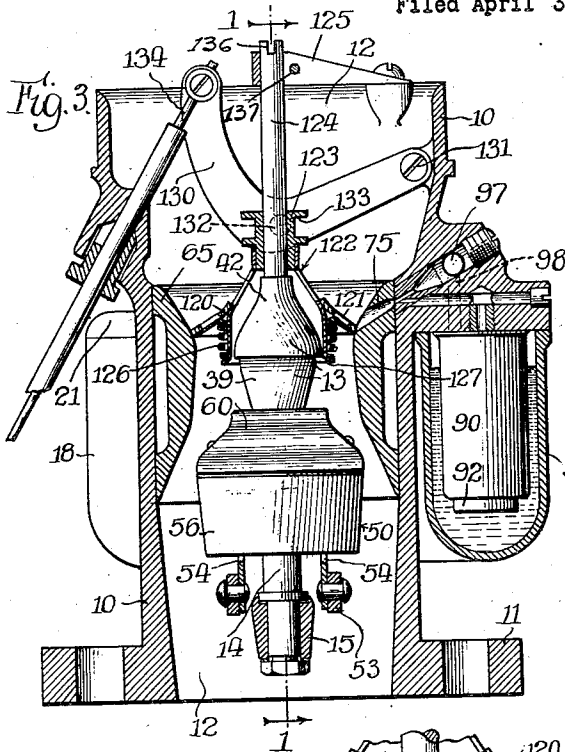
G. A. WAHLMARK

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CARBURETOR

Filed April 30, 1931

2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

1,979,918

CARBURETOR

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to Charles H. Rystrom, both of Rockford, Ill.

Application April 30, 1931, Serial No. 534,003

20 Claims. (Cl. 261—34)

The invention relates generally to carburetors and more particularly to an improved carburetor for internal combustion engines for motor vehicles.

and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

5 The general object of the invention is to provide a new and improved carburetor which is simple in construction and efficient in operation so as to secure the proper mixture for the engine at all operating speeds and during acceleration.

10 Another object is to provide an improved carburetor embodying two venturi in which one controls the flow of fuel when the engine is idling.

Another object is to provide an improved carburetor embodying an auxiliary accelerator 15 mechanism having a combined manual and automatic movement arranged to increase the volumetric capacity of the carburetor and thereby quickly increase the speed of an engine.

Another object is to provide a carburetor having an accelerating mechanism operable manually 20 to increase the volumetric displacement through the carburetor quickly, and as the speed of the motor increases, operable automatically and more slowly further to increase the displacement.

25 Another object is to provide a new and improved carburetor embodying auxiliary accelerating means arranged to supply a quantity of fuel already mixed with air to the main mixing chamber.

30 A further object is to provide in a carburetor an accelerating mechanism embodying a piston and cylinder device, one element of which is movable with the throttle for supplying an increased amount of fuel, together with means adapted to 35 prolong the movement of said element beyond that of the throttle.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying 40 drawings, in which:

Figure 1 is a longitudinal central vertical section through a preferred form of the invention, the view being taken along line 1—1 of Fig. 3.

Fig. 2 is a plan view thereof.

45 Fig. 3 is a transverse central vertical section along the line 3—3 of Fig. 2.

Fig. 4 is a section along the line 4—4 of Fig. 2.

Fig. 5 is an enlarged fragmentary portion of Fig. 3.

50 While my invention is susceptible of embodiment in many different forms, I have shown in the drawings and shall herein describe in detail one such embodiment, with the understanding that the present disclosure is to be considered as an 55 exemplification of the principles of the invention

In the form illustrated in the drawings, the invention comprises a tubular casing or member 60 10 adapted to be mounted in an upright position, by means of lugs 11 formed integrally with the lower end thereof, and having a vertical passage 12 extending therethrough. The casing 10 is arranged to have its lower end connected to the 65 intake manifold of a motor so that air will be drawn in through the top and downwardly through the passage 12 past a fuel discharge means 13 which is mounted centrally therein. The fuel discharge means 13 is secured to the 70 upper end of a stem 14 which is positioned centrally in the passage 12 and is secured at its lower end to an arm 15 which extends inwardly from the side wall of the casing 10. A duct 16 is provided in the stem 14, which duct at its lower 75 end connects with a port 17 in the radial arm 15. The port 17, as hereinafter more fully described, is connected to a fuel supply reservoir 18 and is adapted to supply fuel through the duct 16 to the fuel discharge means 13. 80

The liquid fuel reservoir 18, as shown most clearly in Figs. 1 and 4, is positioned with its upper edge 19 in abutment with the lower horizontal surface 20 of a projecting portion 21 on the casing 10. At its lower end the inner side wall 85 22 of the reservoir is positioned against a flat surface 23 on the casing and is secured thereto by means of a screw 24 which extends through an opening 25 in the reservoir formed concentrically with the port 17. The screw 24 has a 90 bore 26 therein communicating at one end with the port 17 and is also provided with a radial port 27 which communicates with a discharge port 28 in the reservoir 18 through an annular recess 29 in the screw. 95

The projecting portion 21 of the casing 10 has an inlet port 30 arranged for connection to a fuel supply. As illustrated herein (Figs. 1 and 4), said inlet port communicates with a chamber 31 in 100 which a strainer 38 is positioned. After passing through strainer 38 the fuel is conducted to the reservoir 18 through a passage 32 (Fig. 4) and a port 33 which is controlled by a valve 34 operated by a float device 35. The port 33 is formed in a bushing 36 which is screw threaded into the 105 casing portion 21 and also supports the mounting 37 for the float 35. The float operated valve 34 operates in a well-known manner to control the level of the fuel in the reservoir 18 and correspondingly the level of the fuel in the discharge 110

means 13. Preferably a portion of the passageway between the reservoir 18 and the fuel discharge means 13 is of a predetermined cross sectional area so as to control the maximum amount of fuel passing therethrough. In the form illustrated, the port 27 of this passageway is proportioned to accomplish this purpose.

In the exemplary embodiment of the invention, the discharge means comprises a somewhat cup-shaped member 39 having a peripheral wall 40 (Figs. 1 and 5). The stem 14 is provided with a plurality of radial ducts 41 connecting the upper end of the duct 16 with the cup portion of the discharge member 39. The upper part 42 of the discharge means is somewhat conical in shape and has a cylindrical portion 43 projecting down into the cup portion of the member 39 and has an annular flange portion 44 overlying the peripheral wall 40 of the member 39. The flange 44 is preferably provided with a depending portion 45 surrounding the upper edge of the peripheral wall 40. Thus the upper part 42 cooperates with the lower member 39 to provide an annular discharge orifice 46 through which fuel is drawn by the passage of air downwardly through the passage 12.

An annular throttle or control member 50 is slidably mounted on the stem 14 and is operable by means of a control arm 51 (Fig. 2) which is mounted on a shaft 52 rotatably mounted in the casing 10, and is connected to the throttle 50 by means of a lever 53 (Fig. 1) and links 54 (Figs. 3 and 5). The links 54 are pivotally connected at one end to the adjacent bifurcated end of the lever 53 and at their other ends to pins 55 carried on the throttle.

In its preferred form the throttle 50 comprises an annular portion 56 which is supported by means of a plurality of radially extending arms 57 on a sleeve or hub 58 slidably engaging the stem 14. The lower outer surface 59 of the throttle tapers inwardly, as illustrated most clearly in Figs. 1, 3 and 5, and a relatively thin annular member or ring 60 is secured to the upper portion of the throttle. This member is somewhat conical in form and is supported in spaced relation to the annular portion 56 of the throttle so as to provide a narrow annular passage 61 therebetween. At its upper end the collar 60 has an aperture 62 slightly larger than the peripheral wall 40 of the discharge member 39 (Fig. 1), and approximately equal in size to the internal diameter of the depending flange 45 of the upper part 42 of the discharge means. The upper end 63 of the annular portion 56 of the throttle preferably fits snugly around the discharge member 39 when the throttle is in its uppermost position as shown in Fig. 1, so that the fuel drawn from the discharge means passes downwardly through the aperture 62 and through the annular passage 61 into the passage 12.

In the form disclosed herein, the liquid fuel and air are mixed by means including two Venturi passages both of which are operative throughout the normal operating range of the engine, one functioning alone for idling the engine. As illustrated most clearly in Figs. 1, 3 and 5, an annular sleeve 65 is positioned in the passage 12 surrounding the fuel discharge means and is provided with an inner wall having an outwardly flared upper portion 66, an outwardly flared lower portion 67, and an intermediate portion 68 slightly larger at its lower end. The sleeve 65 and throttle 50 are preferably proportioned so that when the throttle is in its uppermost position as shown in Fig. 1, the lower edge of the member 60 of the throttle

fits against the central portion 68 of the sleeve, the lower inwardly tapering portion 59 of the throttle and the top portion 60 cooperating with the sleeve 65 to form a venturi 70. The inner wall 71 of the throttle is preferably somewhat conical in form and the outer wall 72 of the discharge member 39 becomes uniformly smaller toward its lower end so as to form a second venturi 73 therebetween.

When the throttle 50 is in its uppermost or idling position, as illustrated in Fig. 1, the suction from the motor draws air downwardly through the passage 12, in under the depending portion 45 of the upper part 42 of the discharge means, down through the aperture 62 and on down through the annular passage 61. This air draws the necessary fuel through the discharge orifice 46, and passes on between the lower portions of the throttle 50 and sleeve 65 and out of the lower end of the passage 12. As the throttle 50 is lowered to increase the speed of the engine, a certain portion of the air passes through the venturi 70 and combines in the lower portion of the passage 12 with the air and fuel passing through the passage 61. In the lower positions of the throttle, such, for example, as illustrated in Fig. 5, the air passing downwardly intermediate the sleeve 65 and the discharge means draws the fuel from the discharge means, a portion of the mixture passing through the venturi 70 and the remainder through the venturi 73. It will be noted that the venturi 70 functions continuously from an idle position of the throttle to the full open position and that the venturi 73 becomes operable when the upper portion of the throttle moves out of contact with the discharge member 39.

The volumetric fuel capacity of the exemplary embodiment of the invention is normally limited by the port 27 in the fuel supply passage, but in order to increase the volumetric capacity of the carburetor for the purpose of quickly increasing the speed of the engine, the invention provides an auxiliary accelerating means. This means in its exemplary form is arranged to inject additional quantities of mixed fuel and air into the passage 12 in advance of the Venturi passages through a port 75 (Figs. 3 and 5) in the sleeve 65, and comprises means manually operable simultaneously with movement of the throttle 50 and also means operable automatically after movement of the throttle to supply additional pre-mixed fuel through said port.

As illustrated in the drawings, a cylinder 76 is positioned with its lower portion in an annular recess 77 in a projecting portion 78 of the casing 10, and has mounted therein a piston 79. This piston is operable manually in an upward direction by means of a rod 80 positioned intermediate the piston 79 and the right-hand end 81 (Fig. 1) of the lever 53. Thus when the throttle 50 is lowered manually as by means of the arm 51 for the purpose of increasing the speed of the engine, the piston 79 is moved upwardly in the cylinder 76 and compresses air in the upper end thereof. The lower end of the cylinder is in open communication with the passage 12 by means of a recess 89 in the casing portion 78 so that the suction in the passage 12 acts continuously to lower the piston and maintain it in contact with the rod 80.

The rod 80 is slidably supported in a bushing 107 which is carried on an aperture plate 108 positioned in the recess 77 below the cylinder 76. The cylinder 76 has an upper end wall 82 in the central portion of which is secured a fitting 83

having a port 84 communicating with the cylinder and a port 85 connected to a conduit 87 (Figs. 1 and 2). The fitting 83 is provided with an apertured end plate 86 at its upper end and a disk-like check valve 88, so that during downward movement of the piston 79 air may be drawn into the cylinder 76 but during upward movement of the piston the valve 88 prevents the escape of air through the plate 86. Preferably a strainer 106 is provided to prevent foreign matter from entering through the apertured plate.

The conduit 87 at its other end communicates with the means for supplying the additional fuel. This means, as disclosed herein embodies means for utilizing compressed air from the cylinder 78 for discharging additional quantities of fuel and air into the passage 12, and as illustrated most clearly in Figs. 3 and 5, comprises a cup-shaped member 90 secured in a laterally extending portion 91 of the reservoir 18 by means of a bushing 92 and a stem 93, secured at its upper end to the portion 21 of the casing 10 and at its lower end to said bushing. Fuel from the reservoir 18 is admitted to the cup 90 through an aperture 94 in the lower end of the bushing 92 and radially extending ports 95 in said bushing. A check valve 96 is provided to prevent fuel in the cup 90 from flowing back into the reservoir 18.

The conduit 87 (Fig. 2) connects with a port 97 (Figs. 3 and 5) in the casing portion 21, the port 97 being connected to the chamber formed in the cup 90 by means of a vertically extending port 98 so as to subject the fuel in the cup 90 to the air compressed by the piston 79 when the throttle is actuated to increase the engine speed. This pressure acts to discharge fuel from the cup 90 through a passage comprising a duct 99 which is formed in the stem 93 and communicates at its upper end with a horizontal port 100 in the casing portion 21. One end of this port 100 is closed by means of a plug 101 and the other end communicates with an orifice 102 formed in an auxiliary discharge member 103 which is mounted in an inclined bore 104 in the casing. The auxiliary discharge member 103 also has an axially extending port or orifice 105 which communicates at one end with the port 97 by means of the bore 104 and at its other end with the port 75 in the sleeve 65.

Thus with fuel in the cup 90 at the normal level in the reservoir 18, movement of the piston 79 upwardly during a downward accelerating movement of the throttle 50 compresses the air in the cylinder 76 and supplies this compressed air to the upper portion of the cup 90 through the ports 84 and 85, conduit 87, and ports 97 and 98. This pressure in the cup 90 forces fuel up through the duct 99, through the port 100 and out through the orifice 102, while simultaneously a portion of the compressed air passes from the port 97 through the bore 104 and through the orifice 105. In this manner compressed air atomizes and is mixed with the fuel discharged through the orifice 102, so that pre-mixed fuel is supplied through the port 75 to the passage 12.

Preferably means is provided operable to continue the movement of the piston upwardly in the cylinder 76 after a manual movement of the lever 53 for the purpose of even more quickly accelerating the speed of the engine. As illustrated herein, this means comprises a coiled spring 110 which is positioned intermediate the piston 79 and a flanged member 111 secured to the upper end of the piston rod 80. This coiled spring is so proportioned that with the parts in their idling position, as illustrated in Fig. 1, the suction in the lower end of the cylinder 76 is sufficient to draw the piston down and compress the spring. Upon actuating the lever 53, however, to increase the engine speed, the piston 79 is moved upwardly manually and, because of the decreased suction from the engine, the coiled spring 110 expands and continues the piston movement beyond that of the lever 53 to discharge additional quantities of premixed fuel through the port 75. When the engine reaches the speed determined by the position of the throttle, the suction again draws the piston 79 down into contact with the upper end of the rod 80.

The invention also provides an improved choke device for obtaining a rich fuel mixture for starting purposes. In its preferred form this means is illustrated as comprising an annular member or ring 120 having a plurality of apertures 121 therein and yieldably mounted on a supporting sleeve 122, so that when it is in its operative position, as illustrated in Fig. 3, said member and sleeve substantially restrict the cross sectional area of the passage 12 adjacent the fuel discharge means 13. The sleeve 122 is slidably mounted by means of a bushing 123 on a vertically positioned rod 124 which is secured at its lower end to the upper part 42 of the fuel discharge means, and at its upper end to a pair of supporting arms 125 fastened to the upper end of the casing 10. A coiled spring 126 is secured at its lower end to an outwardly extending flange 127 on the sleeve 122; and at its upper end is fastened to an annular check valve member 128 which normally closes the apertures 121 during starting. The sleeve 122 at its lower end is slightly larger in diameter than the upper part 42 of the fuel discharge means so as to form a restricted air passage around the part 42, the sleeve 122 having a plurality of openings 129 spaced around its upper end. Thus if the choke device is moved to its operative position, as shown in Fig. 3, the suction adjacent the fuel discharge orifice 46 is greatly increased. However, if the operator neglects to raise the choke device after the motor has started and sufficient suction is established to overcome the action of the spring 126, the annular check valve 128 is drawn downwardly by the suction. This opens the apertures 121 so as to prevent "flooding" which commonly occurs with prior forms of choke devices.

The choke device may be operated by means of a lever 130 which is pivotally mounted on the casing 10 by means of a screw device 131. This lever is preferably provided with a bifurcated portion having pins 132 engaging an annular groove 133 in the bushing 123, the free end of the lever being secured to a wire 134 which may be connected in a well known manner to a manual control device (not shown).

From the foregoing it is believed apparent that the invention provides a carburetor which is simple in construction and which not only operates to supply increased quantities of fuel to an engine during acceleration, but also is adapted to control efficiently the supply of fuel to the engine when operating constantly at various speeds. It will be apparent that when the throttle is in its idling position, as shown in Fig. 1, the zone of high vacuum is substantially below the annular orifice 46, at the throat of the venturi 70. When the throttle 50 is lowered from its idling position the passage through the venturi 73 is immediately opened, and since the throat of this passage is positioned immediately

diately below and in proximity to the annular discharge orifice 46 it provides a zone of high vacuum effective to provide an increased fuel supply at the low engine speeds where such increased supply is desirable. As the throttle is opened farther the Venturi passages 70 and 73 gradually unite, and when high speeds are reached and the throttle 50 is down near its wide open position against the upper surface of the arm 15, the zone of vacuum has risen and is located above the annular orifice 46 intermediate the upper part 42 of the discharge means and the narrow portion of the sleeve 65. Thus the carburetor also provides for a proper supply of fuel at high speeds where the engine suction is materially reduced.

Combining with the inherent control and proportioning characteristics of the parts forming the Venturi passages the auxiliary accelerating mechanism supplies added quantities of fuel during and after the accelerating movements of the throttle. By providing such an auxiliary or supplemental means for injecting additional quantities of fuel for accelerating purposes, the parts forming the Venturi passages and discharge means may be more accurately designed to operate efficiently at the idling and various running speeds of the engine. This, of course, increases the efficiency during normal operation since these parts are not called upon to supply fuel for acceleration. The accelerating mechanism functions only during actual acceleration of the engine and therefore only at the times when increased fuel quantities are necessary.

The result is a carburetor which not only materially reduces the fuel consumption of an engine by properly proportioning and mixing it at all operating speeds, but also a carburetor which provides for rapid acceleration of the engine with a minimum amount of increased fuel consumption, since the added fuel is supplied only during the accelerating periods.

In addition to the operating advantages resulting, the downward pull on the throttle 50, due to the suction of the engine, is effectively counterbalanced by the downward pull of the piston 79 so as to relieve an operator of the effort which would otherwise be required to overcome the suction of the engine and the usual spring which is provided to return the throttle to its idling position.

In the preferred embodiment of the invention, the rod 124 is secured to the upper part 42 of the fuel discharge means, which part is screw threaded onto the upper end of the stem 14 so that by rotating the rod 124 the vertical distance between the lower surface of the depending portion 45 of the upper part 42 of the discharge means and the adjacent surface of the member 60 may be adjusted for the idling position as shown in Fig. 1. To facilitate this the rod 124 is preferably provided with a diametrical groove 136 at its upper end in which a screw driver may be inserted and may be clamped intermediate the adjacent ends of the supporting arms 125 by means of a screw device 137. Thus the part 42 may be readily adjusted without disturbing the internal parts of the carburetor, and may be effectively secured in its adjusted position.

I claim as my invention:

1. A carburetor comprising, in combination, a tubular casing having a vertical passage therethrough, fuel discharge means positioned substantially centrally in said passage, a fuel reservoir, means for supplying fuel to said discharge

means, a throttle movable longitudinally in said passage for controlling the flow of fuel and air therethrough, means for actuating said throttle including a lever pivotally mounted on said casing, and means for supplying premixed quantities of fuel and air to said passage upon actuation of said throttle to increase the engine's speed comprising a cylinder supported in a vertical position on one side of said casing with its lower end in communication with said passage, a piston in said cylinder, means for connecting said piston for actuation by said lever comprising a slidably mounted rod adapted to engage the under side of the piston, and a coiled spring intermediate the upper end of said rod and the piston, means forming an auxiliary chamber in said fuel reservoir having an opening in the bottom thereof for admitting fuel, valve means for preventing fuel from flowing out of said chamber into the reservoir, a conduit connecting said cylinder with said chamber so that movement of said piston upwardly will increase the pressure in said chamber, means providing a duct from the lower portion of said chamber to said passage at a point above said fuel discharge means through which fuel is forced, and means intermediate said conduit and passage for mixing air with said fuel prior to its discharge into said passage.

2. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means positioned in said passage, a fuel reservoir, means for supplying fuel from said reservoir to said discharge means, a throttle movable in said passage for controlling the flow of fuel and air therethrough, means for actuating said throttle including a movably mounted control member, and means for supplying pre-mixed quantities of fuel and air to said passage upon actuation of said throttle to accelerate the engine comprising a cylinder supported on said casing, a piston in said cylinder, means connecting said piston for actuation by said control member, an auxiliary fuel reservoir, means for supplying fuel to said auxiliary reservoir, a conduit connecting said cylinder with said auxiliary reservoir so that movement of said piston during an accelerating movement of the throttle will increase the pressure in said auxiliary reservoir, means providing a duct from the lower portion of said auxiliary reservoir to said passage through which fuel is forced when the pressure is so increased, and means intermediate said conduit and passage for mixing air with said auxiliary fuel prior to its discharge into said passage.

3. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means positioned in said passage, a fuel reservoir, means for supplying fuel from said reservoir to said discharge means, a throttle movable in said passage for controlling the flow of fuel and air therethrough, means for actuating said throttle including a movably mounted control member, and means for supplying quantities of fuel to said passage upon actuation of said throttle to accelerate the engine comprising a cylinder supported on said casing, a piston in said cylinder, means connecting said piston for actuation by said control member, an auxiliary fuel reservoir, means for supplying fuel to said auxiliary reservoir, a conduit connecting said cylinder with said auxiliary reservoir so that movement of said piston during an accelerating movement of the throttle will increase the pressure in said auxiliary reservoir, and means providing a duct from the lower portion of said aux-

iliary reservoir to said passage at a point above said fuel discharge means through which fuel is forced when the pressure is so increased.

4. A carburetor comprising, in combination, a tubular casing having a vertical passage therethrough, fuel discharge means positioned substantially centrally in said passage, a fuel reservoir, means for supplying fuel to said discharge means, a throttle movable longitudinally in said passage for controlling the flow of fuel and air therethrough, means for actuating said throttle including a lever pivotally mounted on said casing, and means for supplying pre-mixed quantities of fuel and air to said passage upon actuation of said throttle to accelerate the engine comprising a cylinder supported in a vertical position on one side of said casing with its lower end in communication with said passage, a piston in said cylinder, means connecting said piston for actuation by said lever, means forming an auxiliary chamber in said fuel reservoir having an opening below the normal fuel level thereof for admitting fuel, valve means for preventing fuel from flowing out of said opening, a conduit connecting said cylinder with said chamber so that movement of said piston will increase the pressure in said chamber, means providing a duct from below the fuel level in said chamber to said passage at a point above said fuel discharge means through which fuel is forced, and means intermediate said conduit and passage for mixing air with said fuel prior to its discharge into said passage.

5. A carburetor comprising, in combination, a tubular casing having a vertical passage therethrough, fuel discharge means positioned substantially centrally in said passage, a fuel reservoir, means for supplying fuel to said discharge means, a throttle movable longitudinally in said passage for controlling the flow of fuel and air therethrough, means for actuating said throttle including a lever pivotally mounted on said casing, and means for supplying quantities of fuel to said passage upon actuation of said throttle to accelerate the engine comprising a cylinder supported in a vertical position on one side of said casing with its lower end in communication with said passage, a piston in said cylinder, means connecting said piston for actuation by said lever, means forming an auxiliary chamber in said fuel reservoir having an opening below the normal fuel level thereof for admitting fuel, valve means for preventing fuel from flowing out of said opening, a conduit connecting said cylinder with said chamber so that movement of said piston will increase the pressure in said chamber, and means providing a duct from below the fuel level in said chamber to said passage at a point above said fuel discharge means through which fuel is forced.

6. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means positioned in said passage, a fuel reservoir, means for supplying a limited quantity of fuel from said reservoir to said discharge means, a throttle for controlling the flow of fuel and air through said passage, means for actuating said throttle including a movably mounted control member, and means for supplying premixed quantities of fuel and air to said passage upon opening movements of said throttle comprising a cylinder supported on said casing with one end in communication with said passage, a piston in said cylinder, means for connecting said piston for actuation by said control member comprising a slidably mounted rod

adapted to engage said passage side of the piston, and a coiled spring intermediate the upper end of said rod and the piston adapted to expand and actuate said piston when the suction on the passage side of the piston decreases, means forming an auxiliary fuel reservoir having an opening for admitting fuel, valve means for preventing fuel from flowing out of said opening, a conduit connecting the other end of said cylinder with said chamber so that movement of said piston towards that end will increase the pressure in said chamber, means providing a duct from below the fuel level of said chamber to said passage through which fuel is forced, and means intermediate said conduit and passage for mixing air with said fuel prior to its discharge into said passage.

7. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means positioned in said passage, a fuel reservoir, means for supplying a limited quantity of fuel from said reservoir to said discharge means, a throttle for controlling the flow of fuel and air through said passage, means for actuating said throttle including a movably mounted control member, and means for supplying added quantities of fuel to said passage upon opening movements of said throttle comprising a cylinder supported on said casing with one end in communication with said passage, a piston in said cylinder, means for connecting said piston for actuation by said control member comprising a slidably mounted rod adapted to engage said passage side of the piston, and a coiled spring intermediate the upper end of said rod and the piston adapted to expand and actuate said piston when the suction on the passage side of the piston decreases, means forming an auxiliary fuel reservoir having an opening for admitting fuel, valve means for preventing fuel from flowing out of said opening, a conduit connecting the other end of said cylinder with said chamber so that movement of said piston towards that end will increase the pressure in said chamber, and means providing a duct from below the fuel level of said chamber to said passage through which fuel is forced.

8. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means, means for supplying fuel to said discharge means, a throttle for controlling the flow of fuel and air through said passage, means for actuating said throttle including a device movably mounted on said casing, and means for supplying pre-mixed quantities of fuel and air to said passage upon opening said throttle comprising a cylinder supported in a vertical position on one side of said casing with its lower end in communication with said passage, a piston in said cylinder, means for moving said piston in one direction actuated by said lever comprising a movably mounted member, resilient means intermediate said member and the piston, means operable by compressed air from said cylinder to supply added quantities of fuel to said passage, and means for mixing a portion of the compressed air with said fuel prior to its discharge into said passage.

9. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means, means for supplying fuel to said discharge means, a throttle for controlling the flow of fuel and air through said passage, means for actuating said throttle including a device movably mounted on said casing, and

means for supplying quantities of fuel to said passage upon opening said throttle comprising a cylinder supported in a vertical position on one side of said casing with its lower end in communication with said passage, a piston in said cylinder, means for moving said piston in one direction actuated by said device comprising a movably mounted member, resilient means intermediate said member and the piston, and means operable by compressed air from said cylinder to supply added quantities of fuel to said passage.

10. A carburetor comprising, in combination, a tubular casing having a passage therethrough, fuel discharge means, means for supplying normal running quantities of fuel to said discharge means, a throttle for controlling the flow of fuel and air through said passage, means for actuating said throttle including a device movably mounted on said casing, and means for supplying quantities of fuel and air to said passage above said discharge means for accelerating purposes upon opening movements of said throttle comprising a cylinder supported on said casing, a piston in said cylinder, means for connecting said piston for actuation by said device, and means operable by compressed air from said cylinder to supply added quantities of fuel to said passage.

11. A down-draft carburetor comprising, in combination, a casing having a passage therethrough and adapted at its lower end for connection to an engine, fuel discharge means positioned in said passage, control means movable longitudinally of said passage, means for actuating said control means comprising a lever pivotally mounted on said casing, and accelerating mechanism operable during the movements of said lever to increase the engine speed comprising means for supplying fuel to said passage above said discharge means, and means for mixing air with said fuel prior to its discharge into said passage.

12. A carburetor having, in combination, a body member with a passage therethrough, fuel discharge means providing a substantially annular orifice positioned centrally of said passage, means forming a first Venturi passage including a throttle member movable longitudinally of said passage and cooperating with a stationary sleeve in said casing to position the throat of said venturi a substantial distance below said orifice when the throttle member is in its idling position, a downwardly flared annular passage formed intermediate said throttle member and said discharge means normally closed when the throttle is in its idling position and having its throat positioned closely adjacent said annular orifice at low operating speeds, said discharge means and sleeve member cooperating when the throttle is in its high speed positions to form a throat immediately above and surrounding said annular orifice.

13. A carburetor having, in combination, a body forming a passage therethrough, fuel discharge means positioned in said passage and forming a narrow discharge orifice, a throttle member movable longitudinally of said passage from an idling position wherein its upper edge is adjacent said orifice to a lowered high speed position, the adjacent surfaces of said throttle and said discharge means cooperating to form a downwardly flared annular passage at low operating speeds with its throat positioned closely adjacent said orifice, and means forming a Venturi passage when the throttle is in its high speed positions with a throat substantially level with said orifice.

14. A carburetor having, in combination, a body member with a vertical passage extending therethrough, a fuel discharge means positioned substantially centrally of said passage, means for supplying fuel to said discharge means, means forming a downwardly flared passage comprising a portion of said discharge means and a sleeve-like throttle slidable longitudinally of said passage, means forming a venturi comprising the outside of said throttle and a tubular sleeve secured to said body within said passage, means for actuating said throttle comprising a lever pivotally mounted intermediate its ends on said body and connected at one end to said throttle, an auxiliary accelerating mechanism comprising a piston and cylinder device one element of which is operable by the other end of said lever, means forming a passage between said cylinder and the passage through said body above said discharge means, and means operable by compressed air from said cylinder for forcing fuel into said passage above said discharge means.

15. In a carburetor, in combination, a tubular casing providing a passage therethrough, fuel discharge means positioned substantially centrally of said casing and comprising a lower cup-shaped member, means for supplying fuel to the recess in said member and an upper part having a cylindrical portion fitting in said cup, an annular flange overlying said cup, and a downwardly extending peripheral flange overlapping the wall of the cup so as to provide an annular discharge orifice, and means for controlling the flow of fuel and air through said passage comprising an annular throttle member provided with a conically shaped upper surface and arranged to fit snugly around said cup-shaped member when in its upper position, and a thin conical shell secured to said throttle and spaced from said surface so as to provide an annular passage therebetween, the upper end of said shell having an aperture therethrough substantially equal in diameter to the inner wall of said peripheral flange.

16. In a carburetor, in combination, a tubular casing providing a passage therethrough, fuel discharge means positioned substantially centrally of said casing and comprising a lower member and an upper part having cooperating portions forming a narrow annular passage, means for supplying fuel to said passage, said upper part having a downwardly extending peripheral flange overlapping said member so as to provide an annular discharge orifice, and means for controlling the flow of fuel and air through said passage comprising a throttle having an annular member provided with a conically shaped upper surface and arranged to fit snugly around said member when in its upper position, and a thin conical shell secured to said member and spaced from said surface so as to provide an annular passage therebetween, the upper end of said shell having an aperture therethrough substantially equal in diameter to the inner wall of said peripheral flange.

17. In a carburetor, in combination, a tubular casing providing a passage therethrough, fuel discharge means positioned substantially centrally of said casing and providing an annular discharge orifice, and means for controlling the flow of fuel and air through said passage comprising an annular throttle member arranged to fit snugly around said discharge means below said orifice when in its upper position and substantially close said passage, and a thin shell secured to said throttle and spaced therefrom so

as to provide an annular passage therebetween leading from adjacent said orifice.

18. In a carburetor, in combination, a tubular casing providing a passage therethrough, said casing having a projecting portion provided with a substantially horizontal bottom surface, a fuel reservoir secured to said projecting portion with its upper edge against said surface, a cup-shaped member positioned in said reservoir, a hollow stem extending through an aperture in the bottom of said cup-shaped member and into threaded engagement with said projecting portion for securing said member to said portion so as to provide an auxiliary fuel reservoir, valve means at the lower portion of said auxiliary reservoir to permit fuel from the reservoir to flow into but not out of the auxiliary reservoir, a nozzle member positioned in a recess in said casing and comprising a fuel port and an air port, a supply passage through said stem and projecting portion connecting said auxiliary reservoir to said fuel port, means establishing communication between said air port and the upper end of said auxiliary fuel reservoir, and means for controlling the supply of air to said air port.

19. In a carburetor, in combination, a casing having a passage therethrough, fuel discharge and control means positioned in said passage and providing an annular orifice, and means for increasing the richness of the fuel mixture for starting comprising a tubular member movable axially in said casing from an inoperative raised position to a lowered operative position wherein the tubular member fits relatively snugly around

said orifice, said tubular member having a plurality of apertures in its upper end for diverting air between said member and the fuel discharge means and across said orifice, an annular flange mounted on said tubular member having a plurality of apertures therethrough and operative when the tubular member is in its lower position to restrict the passage intermediate the tubular member and the casing, an annular check valve normally closing said apertures, and a coiled spring secured at one end to said valve and at the other to said tubular member so as normally to close said apertures, said valve being operable by suction when the engine has started to open said apertures and prevent flooding.

20. In a carburetor, in combination, a casing having a cylindrical passage therethrough, an annular fuel discharge and control means positioned axially in said passage, and means for increasing the richness of the fuel mixture for starting comprising an annular member movably mounted on said casing from an inoperative position to a position wherein it restricts said passage between the fuel discharge and control means and direct incoming air directly past the fuel discharge means, said member having an aperture therein, a check valve normally closing said aperture, and resilient means for maintaining said check valve in its closed position, said valve being operable by suction when the engine has started to open said aperture and prevent flooding.

GUNNAR A. WAHLMARK.

35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150