

Oct. 18, 1938.

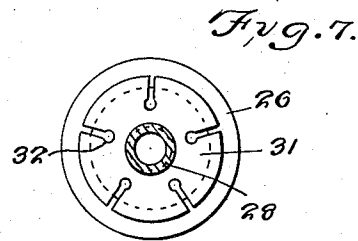
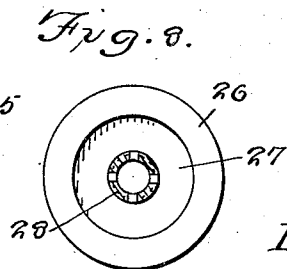
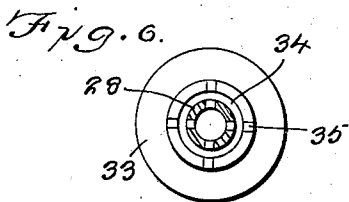
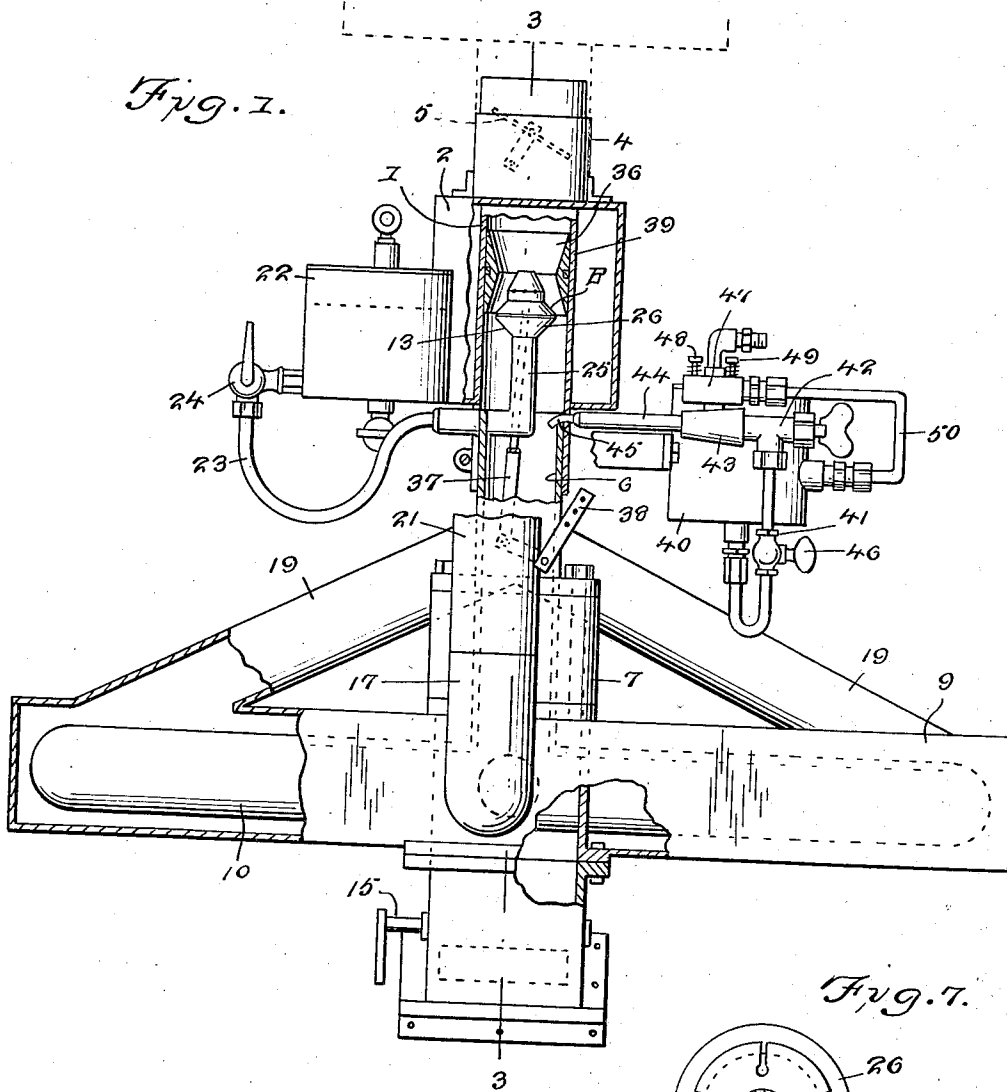
F. E. SMITH

2,133,757

CARBURETOR

Filed May 27, 1937

3 Sheets-Sheet 1



Floyd E. Smith
INVENTOR
BY Victor J. Evans & Co.
ATTORNEYS

Oct. 18, 1938.

F. E. SMITH

2,133,757

CARBURETOR

Filed May 27, 1937

3 Sheets-Sheet 2

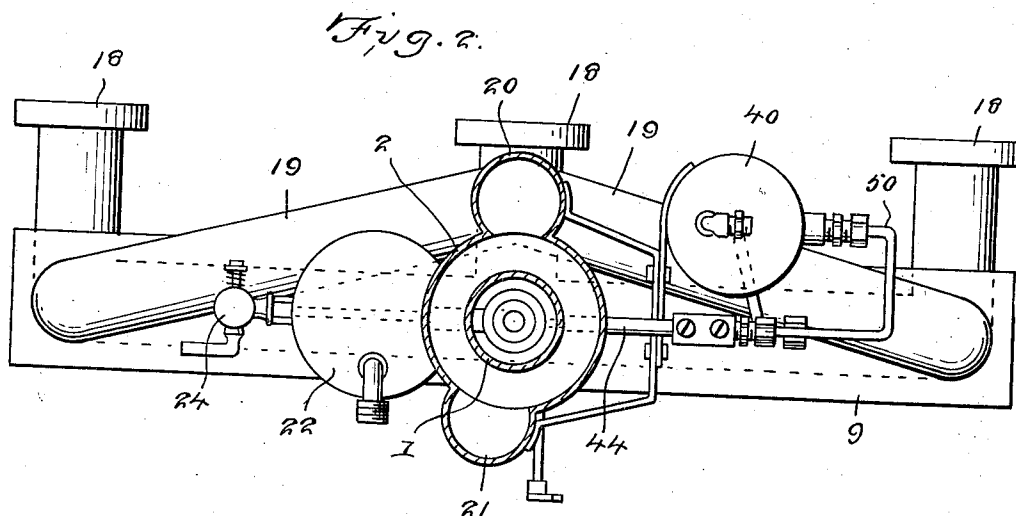
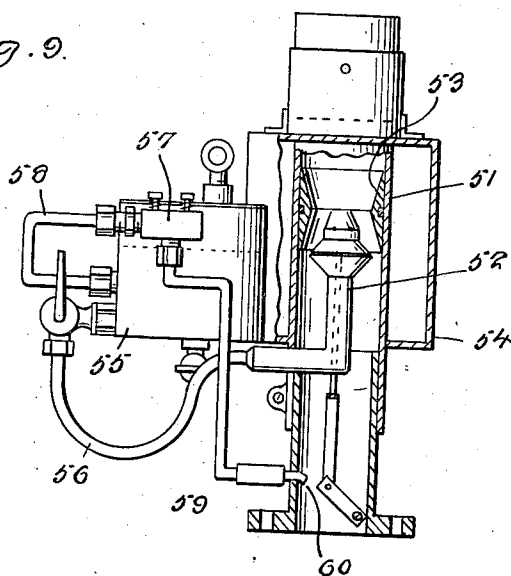


Fig. 9.



Floyd E. Smith
INVENTOR
BY Victor J. Evans & Co.
ATTORNEYS

Oct. 18, 1938.

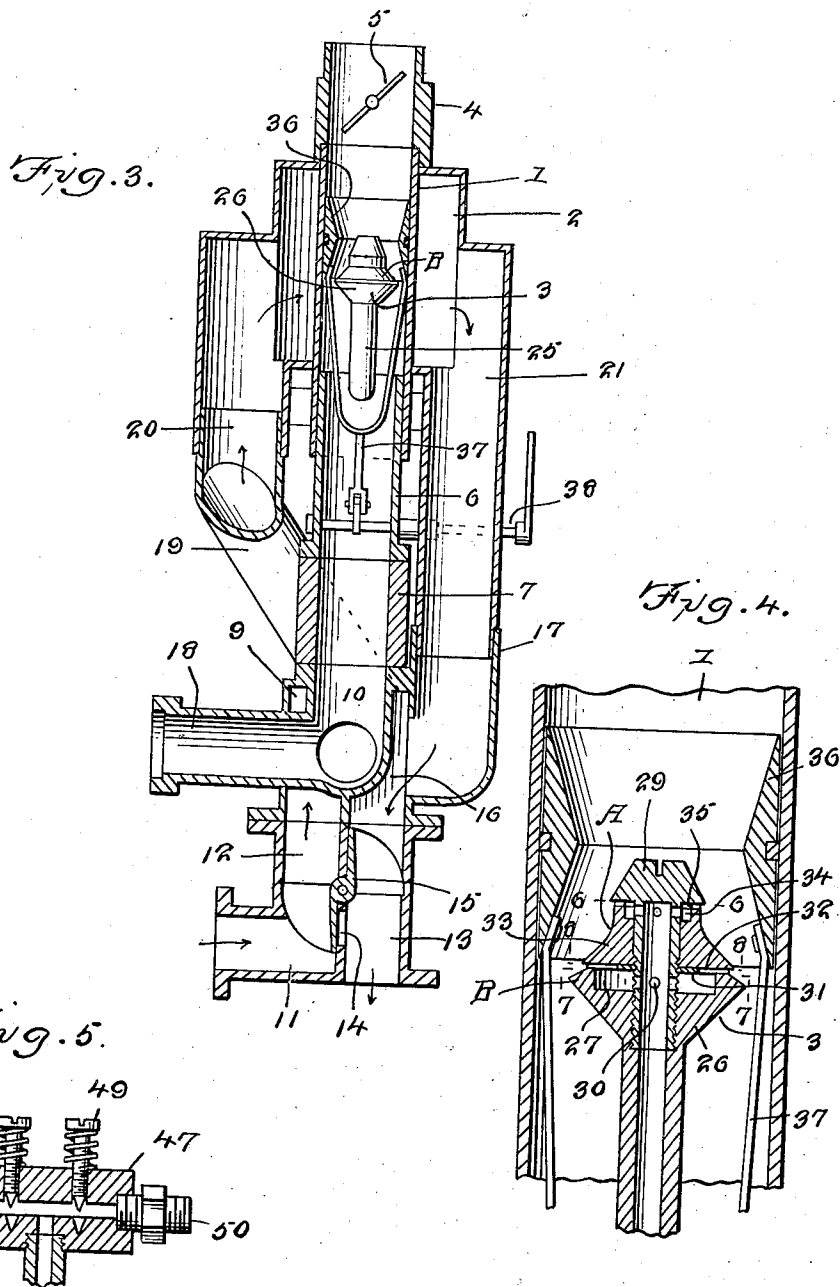
F. E. SMITH

2,133,757

CARBURETOR

Filed May 27, 1937

3 Sheets-Sheet 3



Floyd E. Smith

INVENTOR

BY Victor J. Evans & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE

2,133,757

CARBURETOR

Floyd E. Smith, Hapeville, Ga.

Application May 27, 1937, Serial No. 145,107

2 Claims. (Cl. 261-18)

This invention relates to a carburetor especially adapted for internal combustion engines and has for the primary object the provision of a device of this character which will efficiently vaporize or render crude fuel volatile and properly mix the same with air to produce a fuel for an internal combustion engine whereby maximum power may be had from the engine at a low cost and reduce the formation of carbon to a minimum.

Another object of this invention is the provision of a device of the above stated character which has means for utilizing a high grade fuel for the starting and running of an engine at idling speed and until sufficient heat is obtained to bring about vaporization of the low grade fuel to permit the operation of the engine therefrom at speeds faster than idling speed.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which

Figure 1 is a side elevation, partly in section, illustrating a carburetor constructed in accordance with my invention.

Figure 2 is a top plan view partly in section illustrating the same.

Figure 3 is a sectional view taken on the line 3-3 of Figure 1.

Figure 4 is a fragmentary vertical sectional view illustrating the low grade fuel jet and a choke operating in conjunction therewith for controlling the supply of air.

Figure 5 is a detail sectional view showing the combined air and high grade fuel control device.

Figure 6 is a sectional view taken on the line 6-6 of Figure 4.

Figure 7 is a sectional view taken on the line 7-7 of Figure 4.

Figure 8 is a sectional view taken on the line 8-8 of Figure 4.

Figure 9 is a side elevation, partly in section, illustrating a modified form of my invention for the utilization of a high grade fuel.

Referring in detail to the drawings, the numeral 1 indicates a mixing chamber which, as shown in this instance, is of tubular formation. However, the chamber 1 may take on other shapes without departing from this invention.

Integral with and surrounding the mixing chamber is a heating chamber 2 and also positioned in the mixing chamber is a low grade fuel nozzle 3. One end of the chamber 1 is connected onto a fitting 4 to provide an air intake and in which operates a choke valve 5 of the butterfly type. An ordinary air cleaner may be connected onto the fitting 4, as indicated by dotted lines in Figure 1. The mixing chamber 1 is disposed vertically with the fitting 4 positioned uppermost. The lower end of the mixing chamber 1 is fitted on a sleeve 6 which in reality forms a continuation of the mixing chamber 1. A fitting 7 connects with the lower end of the sleeve 6. The fitting forms a connection between the sleeve 6 and intake manifold 10 which forms an integral part of a stove 9. The intake manifold stove 9 is shaped to enclose the major portion of the intake manifold 10 and is provided with a connecting neck 11 which may be connected with an exhaust pipe (not shown) of the engine so that exhaust from the engine may pass into the stove 9 for heating the intake manifold to a maximum temperature. The connecting neck 11 is in the form of a fitting detachably secured onto the stove and has exhaust passages 12 and 13 communicative with each other by a port 14 controlled by a valve 15. The exhaust passage 12 delivers exhaust into the stove 9 while the passage 13 connects with an auxiliary passage 16 formed in the stove and which opens outwardly through one wall of said stove in the form of a pipe 17. The outer end of the exhaust passage 13 of the fitting is adapted to be connected to the exhaust pipe of the engine for returning exhaust to said exhaust pipe. The major portion of the intake manifold 10 is confined in the stove 9 and is provided with a plurality of discharge necks 18 adapted for connection onto the intake ports of the engine (not shown) and which intake ports lead to the firing chambers of the engine.

Connecting on the stove 9 adjacent its ends are converging pipes 19 and which terminate in a single delivery neck 20 having connection with one side of the heating chamber 2, the opposite side of the heating chamber being in communication with a pipe 21 connecting with the pipe 17. Thus it will be seen that the exhaust enters the stove 9 by way of the passage 12 circulating about the intake manifold 10 and thence passing upwardly from the stove by way of the pipes 19 to the heating chamber 2 and thence through the pipes 21 and 17 and through the passages 16 and 13 back to the exhaust pipe of the engine.

Therefore, it will be seen that the intake manifold 10 is heated to a high temperature and also the mixing chamber 1, the intake manifold being heated to a higher temperature than the mixing chamber.

A conventional type of float controlled fuel bowl 22 is carried by and in direct contact with the heating chamber 2 so that fuel therein will be preheated prior to entering the mixing chamber 1. A pipe 23 having a cutoff valve 24 therein is connected at one end to the bowl 22 and its opposite end is connected to the nozzle 3. The fuel nozzle 3 includes an L-shaped tube 25 in which one leg portion thereof is disposed vertically in the mixing chamber 1, while the opposite leg extends through a wall of the mixing chamber and has the fuel pipe 23 connected thereto. A low grade fuel is supplied to the bowl 22 in any well known manner and the height of the fuel in the bowl is governed by the float. A nozzle head 26 of substantially inverted conical shape forms a part of the vertically disposed leg portion of the nozzle and in which is formed a fuel pot or recess 27. A tube 28 is threaded into a screw threaded passage formed in the head and which communicates with the vertical leg portion of the tube 25 and carries at its upper end a substantially conical-shaped head 29 spaced from the head 26. Ports 30 are formed in the tube 28 and communicate with the fuel pot or recess 27. Fuel from the bowl 22 will pass into the pot or recess 27 by seeking its level, however, the upper edge of the pot or recess is slightly above the level of the fuel in the bowl 22 to prevent the fuel from spilling over from the pot or recess 27. A plate 31 is mounted on the tube 28 and rests on the head 26, consequently overlying the pot or recess 27. A plurality of radially arranged slots 32 is formed in the plate which slots open outwardly through the edges of said plate and portions of said slots overlie the pot or recess 27. A substantially conical-shaped member 33 is mounted on the tube 28 and rests on the plate and overlies the slots so that said slots only open outwardly into the mixing chamber 2 at the edges of said plate. The plate and its slots cooperate in defining a plurality of radially arranged jets for delivering fuel from the pot or recess 27 into the mixing chamber. The upper end of the member 33 has formed therein a fuel pot or recess 34 over which the head 29 lies, the lower face of said head rests on the upper end of the member 33. The upper end of the member 33 has grooves 35 formed therein opening through the outer walls of the member 33. The head 29 overlies the grooves so that they cooperate with the member 33 in forming jets for delivering fuel from the pot or recess 34 into the mixing chamber above the jets provided by the plate 31. Therefore, it will be seen that the fuel nozzle has groups of superimposed jets. The substantially conical-shaped member 33 upon its outer faces is curved, as shown at A. The upper group of jets are located in a plane above the level of the fuel in the bowl 22 so that the fuel in order to escape to the mixing chamber by way of the upper group of jets must be raised in the tube by suction. This also applies in reference to the lower group of jets, however, the raising of the fuel to pass out of the lower group of jets will be much less than the upper group of jets. The conical-shaped head 26 has beveled faces B that extend outwardly and downwardly from the lower group of jets. The

pot or recess 34 is placed in communication with the tube 28 by ports 35.

Slidably mounted in the mixing chamber 1 is a Venturi element 36 which cooperates with the nozzle 26 in controlling fuel therefrom and also acts as an air control valve. The Venturi element controls the speed of operation of the engine to which the carburetor is adapted by being adjusted endwise. An operating link 37 is connected to the Venturi element and to an operating shaft 38. The operating shaft is adapted for connection with a conventional type of control or accelerator pedal (not shown) whereby the Venturi element may be slid in opposite directions in the mixing chamber and relative to the nozzle 26. The Venturi element 36 when positioned at the end of its movement in one direction, brings the restricted part of its passage into engagement with the face B of the nozzle 26 and thereby cuts off the air past the jets of the nozzle, the engine then receives high grade fuel from means to maintain operation thereof at idling speed and which will be hereinafter described in detail. The Venturi element on being moved away from the nozzle 26 or the lower group of jets thereof will permit air to be drawn into the mixing chamber past said last group of jets to draw a low grade of fuel from the pot or recess 27 in proper proportion to the amount of air passing into the mixing chamber for producing a fuel mixture capable of operating the engine at a speed greater than idling speed. As the Venturi element is gradually moved farther from the nozzle, additional air is admitted to the mixing chamber and an additional amount of low grade fuel is obtained from the upper group of jets, consequently increasing the speed of operation of the engine. As the restricted portion of the Venturi element reaches a plane slightly above the upper group of jets the passage between the latter and the Venturi element is restricted causing the incoming air to create a suction in the upper group of jets which elevates the column of fuel in the tube 28 to overflow into the pot or recess 34 and pass therefrom into the mixing chamber by way of the upper group of jets. Thus it will be seen that as the Venturi element acting as a control valve, moves farther towards its open position an additional supply of low grade fuel will be directed into the mixing chamber by the upper group of jets over the supply of low grade fuel furnished by the lower group of jets. The incoming air is proportionately increased with the increase of the amount of incoming fuel so that a proper combustible mixture will be had for the engine operating at speeds greater than idling speed, the air and low grade fuel being entirely controlled by the Venturi element acting as a throttle valve. The Venturi element is equipped with a ring, similar in construction to a piston ring, which contacts the walls of the mixing chamber to effect a seal between the Venturi element and the walls of said mixing chamber and which compensates for expansion and contraction in these parts. The low grade of fuel being preheated prior to reaching the nozzle will aid in the breaking up of the fuel into small particles as it passes from the jets and as the walls of the mixing chamber are heated, these small particles of low grade fuel become volatile and readily mix with the incoming air, producing an efficient and economical fuel which will be further heated to a higher degree when passing through the intake manifold 10. Thus it will be seen that this fuel is at

its highest temperature when delivered into the firing chambers of the engine, consequently assuring a more thorough combustion thereof permitting maximum power to be obtained by the engine with the accumulation of carbon reduced to a minimum.

A low grade fuel when discharged by jets and subjected to heat will become volatile and can be successfully employed for the operation of an engine, while the speed of the engine is greater than idling speed. However, when the engine is operating at idling speed it should be furnished with a high grade of fuel. Also in starting a cold engine it should be started on a high grade fuel. Therefore, means has been provided for introducing into the mixing chamber at the time of the starting of the engine a high grade fuel which will readily vaporize under atmospheric temperatures. This high grade fuel is also introduced into the mixing chamber during the operation of the engine at idling speed. This means consists of a float controlled bowl 40 suitably supported on the mixing chamber and fed in any well known manner with a high grade fuel. Connected on the bowl 40 is a fuel pipe 41 having a control valve 42, preferably of the needle type. The control valve 42 is connected with the mixing chamber 43 for delivering therein a high grade of fuel from the bowl 40. The mixing chamber 43 or the lower wall thereof is in a plane slightly above the level of the fuel in the bowl 40, so that fuel may be drawn into the mixing chamber by suction from the engine, the amount of fuel being regulated by the needle valve 42. At this time the Venturi element has been brought into engagement with the face B of the nozzle cutting off the ordinary supply of air and the supply of low grade fuel. To place the mixing chamber 43 in communication with the mixing chamber of the carburetor a nozzle 44 is connected onto the mixing chamber 43 and extends into the mixing chamber 1 of the carburetor in the form of a curved tip 45, the free end of which is directed in the direction of the outlet of the mixing chamber 1. A cutoff valve 46 is provided in the pipe 41. The high grade fuel in a substantially raw state will be drawn into the engine to facilitate the starting thereof when cold. Connected to the mixing chamber 43 and located in a plane above the latter is an auxiliary air and fuel mixing chamber 47 having control valves 48 and 49 for regulating a mixture of air and high grade fuel to the mixing chamber 1. The auxiliary mixing chamber 47 is connected to the bowl 40 by a pipe 50. As soon as the engine starts on the high grade fuel as described it then draws air and high grade fuel into the mixing chamber by way of the nozzle 45 the latter receiving the air and high grade fuel from the auxiliary mixing chamber 47. Sufficient air and high grade fuel will be thus obtained for the operation of the engine at idling speed. As soon as the exhaust from the engine has heated the mixing chamber 1, the Venturi element may be then moved towards an open position permitting the engine to draw into the mixing chamber 1 the low grade fuel so that the engine operates on the low grade fuel at all speeds except idling speed. As soon as the Venturi element moves towards an open position opening the main air supply to the mixing chamber suction will be discontinued on the nozzle 45 and thereby eliminate the high grade fuel entering the mixing chamber 1. The auxiliary mixing chamber 47 is shown in detail in Figure 5

and it is apparent that one end of its passage is open to the atmosphere to admit air controlled by the valve 48 while another end of its passage is connected to the mixing chamber 43 and still another end of its passage connected to the bowl 40 by the pipe 50 and said last-named end of its passage is controlled by the valve 49. Through the adjustments of the valves 48 and 49 a proper mixture of air and high grade fuel can be had to sustain operation of the engine at idling speed.

The amount of exhaust flow through the stove 9 can to some degree be controlled by the valve 15 and when the amount of exhaust is desired to be decreased the valve 15 is moved towards an open position, so that some of the exhaust can pass from the passage 12 directly into the passage 13. This is done in case too much heat is furnished for the heating of the mixing chamber.

Referring to my modified form of the invention some of the operations referred to in connection with the form of carburetor shown in Figure 1 are cooperated in the modification except that the latter is arranged solely for the use of high grade fuel. The mixing chamber 51 thereof and the nozzle 52 are identical in construction to the mixing chamber 21 and the nozzle 25 also the Venturi tube 53 operates in a similar manner to the Venturi tube 36. Further, the mixing chamber 51 is heated by exhaust passing through a chamber 54 similar to the heating chamber 2. A float controlled fuel bowl 55 is supported by and in direct contact with the heating chamber 54 and receives in the ordinary manner from a supply a high grade of fuel. Connected to the bowl 55 is a pipe 56 which is in turn connected to the nozzle 52 whereby the fuel in the bowl 55 may seek a corresponding level in the nozzle 52. A mixing chamber 57 similar in construction to the auxiliary mixing chamber 47 is located in a plane slightly above the level of the fuel in the bowl 55 and is connected to the latter by a pipe 58. A pipe 59 connects the mixing chamber with an idling jet 60 located in the mixing chamber below the nozzle 52. A carburetor, as shown in Figure 9, when adapted to an engine will supply the latter with a high grade fuel properly mixed with air and preheated for the operation of said engine when operating under load. However, when the Venturi tube 53 is positioned for reducing the operation of the engine to idling speed sufficient fuel is then admitted to the mixing chamber by way of the idling jet 60.

What is claimed is:

1. A carburetor comprising a vertically arranged mixing chamber open at its upper end to the atmosphere, means connecting the lower end of said chamber to an intake manifold of an engine, a nozzle located in the chamber with the discharge end thereof disposed uppermost, an exhaust stove surrounding the major portion of the mixing chamber and substantially the entire portion of the intake manifold, with said means arranged exteriorly of the stove and including an intake passage and an exhaust passage and a low grade float control fuel supply means engaging and supported by the stove and connected to said nozzle, and a high grade fuel nozzle connecting with the mixing chamber below the first nozzle and within the mixing chamber non-covered by said stove, a high grade fuel and air supply means connected to said second nozzle, and a manually actuated slidable Venturi element in said mixing chamber and movable

relative to the first nozzle and in engagement with the latter when high grade fuel is desired from the second nozzle.

2. A carburetor comprising a vertically arranged mixing chamber open to the atmosphere at its upper end, means connecting the lower end of said chamber to an intake manifold of an engine, a nozzle located in the chamber with the discharge thereof including a pair of ports and
- 10 jet passages arranged in superimposed relation, an exhaust stove surrounding the major portion of the mixing chamber and substantially the entire portion of the intake manifold and including an air intake passage and an exhaust passage
- 15 having direct communication with each other adjacent the intake end of the intake passage, a valve for controlling the communication be-

tween said passages, a low grade float controlled fuel supply means engaging the stove to be heated thereby and connected to said nozzle, a high grade fuel nozzle entering the mixing chamber below the first-named nozzle, a high grade fuel and air supply means connected to said second nozzle, and a manually actuated slidable Venturi element in said mixing chamber and movable relative to the first nozzle for controlling the flow of air past said nozzle and the fuel from the jet passages thereof and may be brought in engagement with said first nozzle to cut off the flow of low grade fuel from the jet passages and thereby permit high grade fuel to be obtained from the second nozzle by the suction of the engine.

FLOYD E. SMITH.