May 20, 1930. W. J. LINN 1,758,954

CARBURETOR

Filed Jan. 26, 1923 2 Sheets-Sheet 1

Fig. 1.

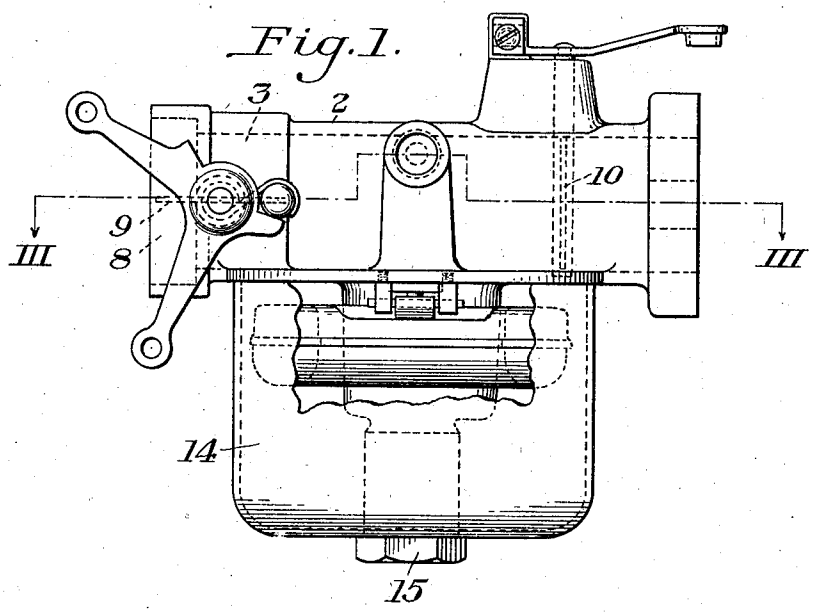
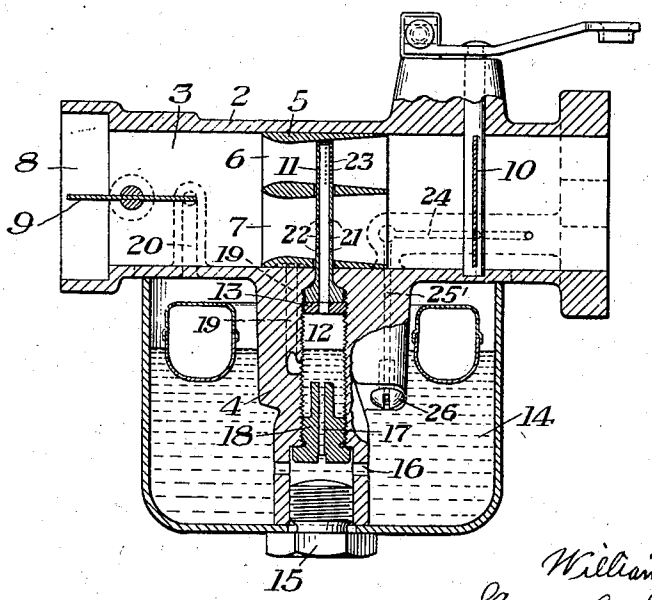


Fig. 2.



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May 20, 1930. W. J. LINN 1,758,954

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Filed Jan. 26, 1923 2 Sheets-Sheet 2

Fig.3.

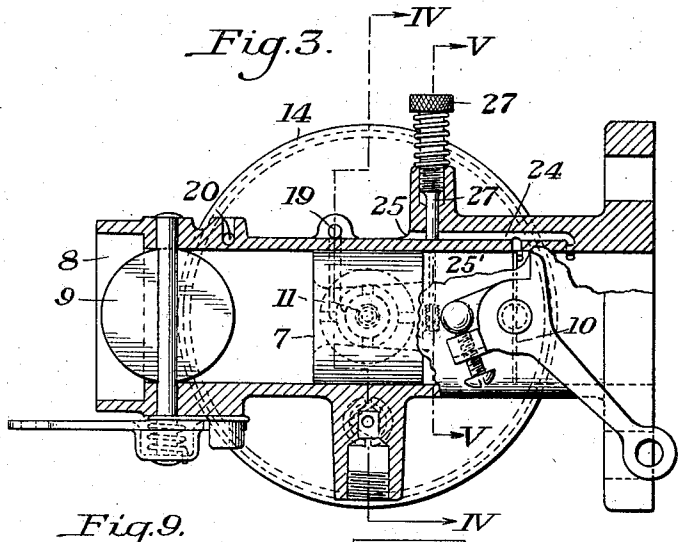


Fig.6.

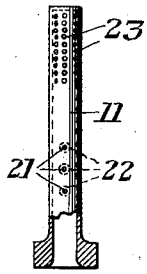
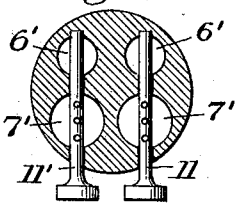


Fig.9.



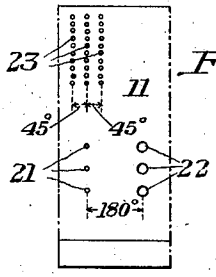
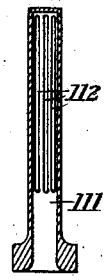


Fig.7.

Fig.8.



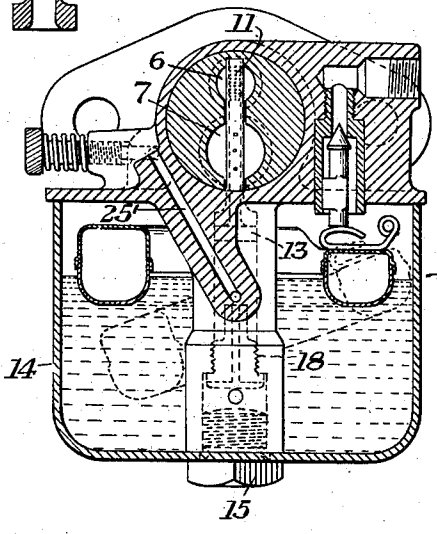


Fig.4.

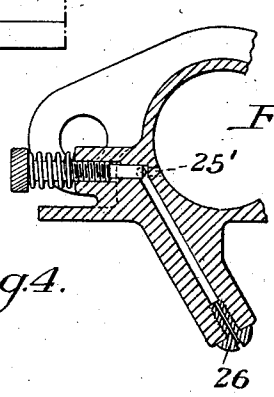


Fig.5.

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Patented May 20, 1930 1,758,954

UNITED STATES PATENT OFFICE

WILLIAM J. LINN, OF PITTSBURGH, PENNSYLVANIA

CARBURETOR

Application filed January 26, 1923. Serial No. 614,981.

The present invention relates broadly to the art of forming a combustible mixture for internal combustion engines and more particularly to an improved carburetor for supplying such a mixture to the engine.

It has heretofore been proposed in the art to which this invention relates to provide carburetors with automatically effective means for compensating any tendency to unduly enrich the mixture as the suction to which the carburetor is subjected increases. It has also been proposed to provide a plurality of independent Venturi tubes adapted to independently and successively supply such a mixture to the engine.

By the present invention certain of these features have been combined in a novel manner whereby the Venturi capacity of the carburetor is constant at all times, a plurality of venturis being fed by a single nozzle in such manner that variations in the suction to which the carburetor is subjected automatically control the supply of the desired amount of fuel.

In the accompanying drawings there are shown for purposes of illustration only certain embodiments of the present invention, it being understood that the drawings do not define the limits of my invention and that changes may be made in the construction and operation disclosed therein without departing from the spirit of the invention or scope of my broader claims.

In the drawings,

Figure 1 is a side elevation, partly broken away, of one form of carburetor embodying the present invention;

Figure 2 is a vertical sectional view through the carburetor shown in Figure 1;

Figure 3 is a transverse sectional view on the line III—III of Figure 1;

Figure 4 is a vertical sectional view on the line IV—IV of Figure 3 looking in the direction of the arrows;

Figure 5 is a detail sectional view on the line V—V of Figure 3 looking in the direction of the arrows;

Figure 6 is a side elevation, partly broken away, illustrating one form of fuel feeding nozzle;

Figure 7 is a development of a portion of the nozzle surface illustrating one arrangement of the openings therein;

Figure 8 is a vertical sectional view through a modified form of nozzle, and

Figure 9 is a transverse sectional view illustrating a modified form of Venturi arrangement and fuel feeding nozzles.

In carrying out the present invention there may be provided a main body portion 2, preferably in the form of a casting, having a horizontally extending opening 3 forming an air inlet passage and carbureting chamber, and a depending stem 4 to which the float chamber may be secured.

Held in position within the opening 3 is a Venturi plate 5 which, in the construction illustrated in Figures 1 to 5 both inclusive, has an upper relatively small venturi 6 and a lower relatively larger venturi 7. These venturis 6 and 7 have their axes extending in parallelism with the axis of the opening 3, and are adapted to supply substantially all of the air required by the engine. It will be apparent, therefore, that their total capacity may be varied in accordance with the piston displacement of the particular engine with which the carburetor is to be utilized. The opening 3 may have either hot or cold air supplied to its inlet 8 as is customary in the art, which inlet may be controlled, if desired, by a butterfly valve 9. The supply of combustible mixture may in turn be regulated by a throttle valve 10 of any usual construction.

As the butterfly valve 9 turns in a counterclockwise direction as viewed in Figure 2, opening of the valve initially deflects air traversing the inlet 8 toward the lower venturi 7, thereby increasing the depression in venturi 7 over that in venturi 6. This action causes a greater amount of air to normally traverse the venturi 7 than the venturi 6 and also causes the venturi 7 to be effective before the venturi 6. The valve 9 tends to deflect more air toward the venturi 7 than toward the venturi 6 until the full open position is reached.

For supplying fuel to the venturis 6 and 7 there may be provided a nozzle 11 such as shown, for example, in Figure 6 of the drawings. This nozzle is adapted to be slipped up-

wardly through the vertically extending opening 12 in the stem 4, and is held in position by a plug 13 screwed upwardly against the lower end of the nozzle. Both the plug and the nozzle are provided with a central opening permitting the passage of fuel therethrough. This fuel is in turn supplied from the float chamber 14, which may be in the form of a shell held in position on the stem 4 by a suitable cap screw 15. The fuel passes from the float chamber through openings 16 in the stem 4 and thence upwardly through the calibrated orifice 17 in the submerged plug 18. This plug directly controls the total amount of fuel which can pass to the nozzle 11.

In order to effect a compensation and thereby negative the tendency of the fuel feed to increase as the suction increases, the nozzle 11 is preferably of the air bled type, that is, it is provided with an air inlet anterior to its point or points of discharge into the Venturi tubes 6 and 7. This air inlet may be in the form of a passage 19, as clearly shown in Figures 2 and 3, which passage opens at one end to the atmosphere and at the other end to the space between the plug 18 and the nut 13. It will be understood that atmospheric pressure, or substantially atmospheric pressure, is preferably maintained within the float chamber through an atmospheric vent 20.

The nozzle 11 is peculiarly formed whereby desirable fuel feeding results are obtained. This construction is illustrated in detail in Figures 6 and 7 and comprises, according to one form of the invention, a plurality of fuel feeding holes 21 formed therein in such manner as to project substantially in line with the flow of air through the venturi 7. These openings permit the discharge of fuel into the lower venturi for forming a combustible mixture with the air supplied therethrough. As the holes are of comparatively small diameter it will be apparent that the passage of the fuel therethrough at relatively high velocity, produces efficient atomization. A further compensating action, in order to prevent too great a tendency to enrich or load in the lower ranges of the carburetor is produced by providing a second series of holes 22 in the nozzle in the opposite side thereof and substantially in line with the holes 21. It will be understood by those skilled in the art that the holes 22 permit the passage of air into the nozzle and thereby partly satisfy the engine suction. This action prevents the fuel from rising to any very great extent in the nozzle while the engine is operating at its lower speeds. During such times, the combustible mixture is supplied entirely by the lower venturi 7, the upper venturi being effective for supplying air only. As the throttle is opened, however, the carburetor is subjected to a greater engine suction, which suction is sufficient to raise the level of fuel in the nozzle 11. Under these conditions this extra fuel is permitted to pass into the upper venturi 6 through a series of small holes 23, which holes are preferably arranged in rows extending at an angle to each other as clearly shown in Figure 7, whereby the fuel discharges into the smaller venturi in a plurality of directions. The number and arrangement of the holes 21, 22 and 23 are determined and largely governed by the demands of the engine which the carburetor is designed to supply. The provision of holes so arranged, however, that the venturis may successively supply combustible mixtures or simultaneously supply combustible mixtures even though they are always both open to permit the passage of air therethrough, is extremely important. This is also true of the air admission holes 22 functioning as pointed out herein.

For slow speeds or idling, a mixture may be furnished through the conduit 24 having an opening 25 to the atmosphere as clearly shown in Figure 3 and having a branch 25′, shown in detail in Figure 5 leading to a calibrated plug 26 submerged below the level of fuel in the float chamber. The mixture supplied by the conduit 24 may be regulated and controlled by a valve 27, in any usual manner.

The advantages of the present invention arise from the provision of a carburetor having a plurality of venturis, all of which are simultaneously brought into action to permit the passage of air therethrough, but which are successively operative in accordance with engine demands for supplying a combustible mixture to satisfy the engine requirements.

In certain cases, with engines of extremely large capacity, there may be provided a plurality of pairs of venturis 6′ and 7′ as illustrated in detail in Figure 9, each pair of venturis being supplied by a single nozzle 11′.

Also, under certain conditions, the nozzle 111 as shown in Figure 8 may have a series of slots 112 formed therein in lieu of the individual fuel feeding openings.

With the various embodiments illustrated herein there is always obtained the desired atomization of the fuel together with automatic compensation in accordance with the demands as determined by the suction to which the carburetor is subjected.

I claim:

1. In a carburetor, a carbureting chamber having a fixed air opening, a plurality of Venturi tubes in said chamber, said tubes being disposed with their axes substantialy parallel and in substantially the same vertical plane, a single vertical nozzle cooperating with at least two of said Venturi tubes, said nozzle having openings into the Venturi tubes

for the discharge of fuel thereinto, said nozzle having openings in one side thereof for the passage of air and openings in the opposite side thereof for the discharge of fuel, said openings being substantially parallel to the air flow through the Venturi tube.

2. In a carburetor, a carbureting chamber having a fixed air opening, a plurality of co-extensive Venturi tubes in said chamber, said tubes being disposed with their axes substantially parallel and in substantially the same plane, a single nozzle extending through one of said tubes into a second tube at substantially right angles to the direction of flow of the air through both of said tubes, said nozzle having openings into the Venturi tubes for the discharge of fuel thereinto, said nozzle having openings in one side thereof for the passage of air and openings in the opposite side thereof for the discharge of fuel, said openings being substantially parallel to the air flow through the Venturi tube.

3. In a carburetor, a carbureting chamber having a fixed air opening, a plurality of co-extensive Venturi tubes in said chamber, said tubes being disposed with their axes substantially parallel and in substantially the same plane, a single nozzle extending through one of said tubes into a second tube, said nozzle having openings into the Venturi tubes for the discharge of fuel thereinto, said nozzle having openings in one side thereof for the passage of air and openings in the opposite side thereof for the discharge of fuel, said openings being substantially parallel to the air flow through the Venturi tube.

4. A carburetor comprising a mixing chamber having a fixed air opening, a plurality of co-extensive Venturi tubes in said chamber, said tubes being disposed with their axes substantially parallel and in substantially the same plane, a nozzle co-operating with said tubes for supplying liquid fuel thereto and a valve disposed in said mixing chamber in advance of said tubes and positioned so as to concentrate air upon one of said Venturi tubes when initially being opened.

5. In a carburetor, a carbureting chamber having a fixed air opening, a plurality of co-extensive Venturi tubes in said chamber, said tubes being disposed with their axes substantially parallel and in substantially the same plane, a single nozzle co-operating with said tubes for supplying liquid fuel thereto and a pivotally mounted valve disposed in said chamber in advance of said tubes and rotatable in a direction to cause the concentration of admitted air at one of said tubes during the initial opening movement of said valves.

In testimony whereof I have hereunto set my hand.

WILLIAM J. LINN.