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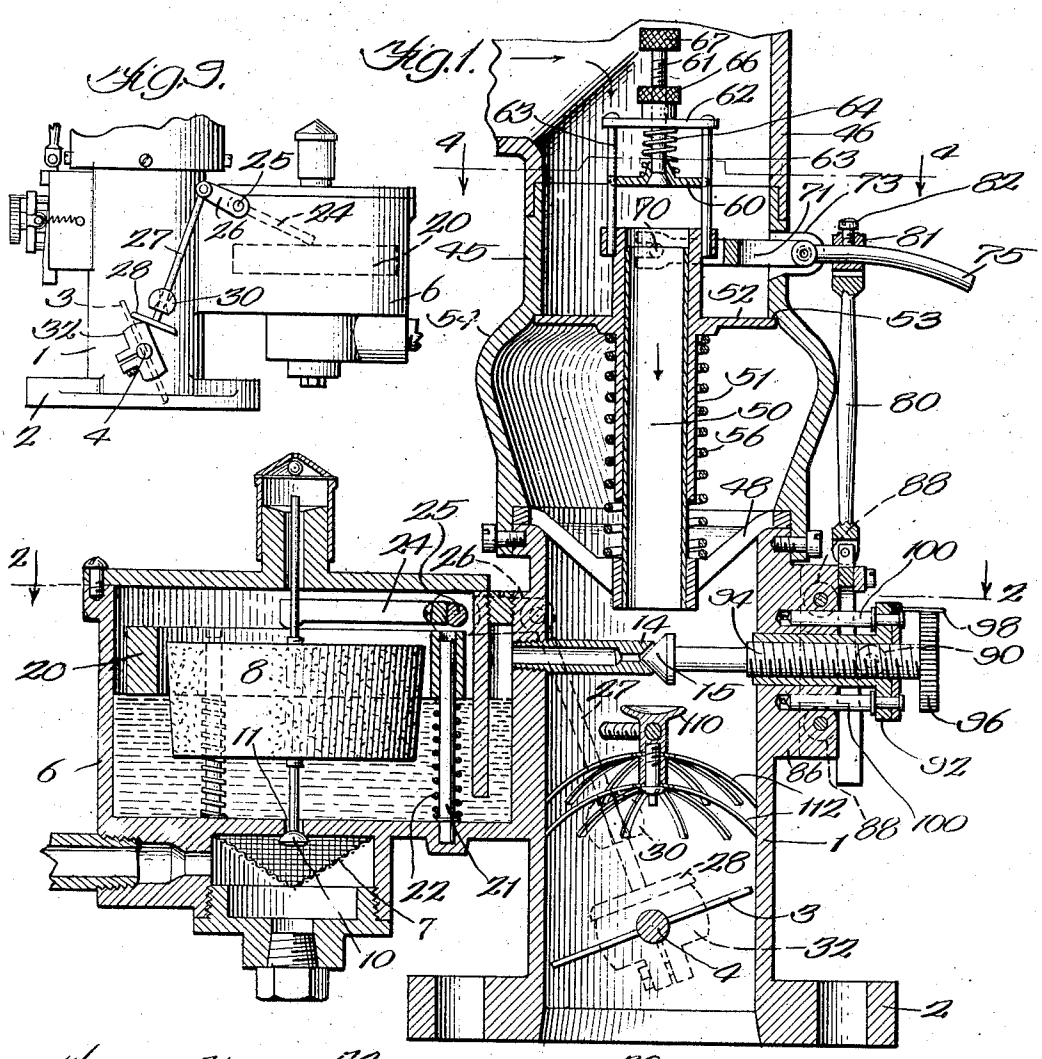
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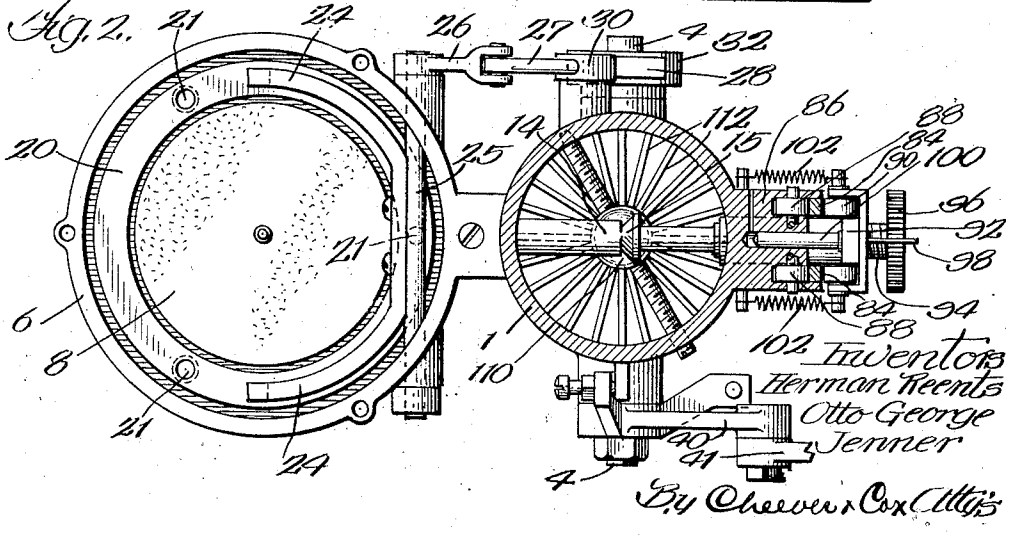
H. REENTS ET AL

CARBURETOR

Filed August 8, 1921

2 Sheets-Sheet 1





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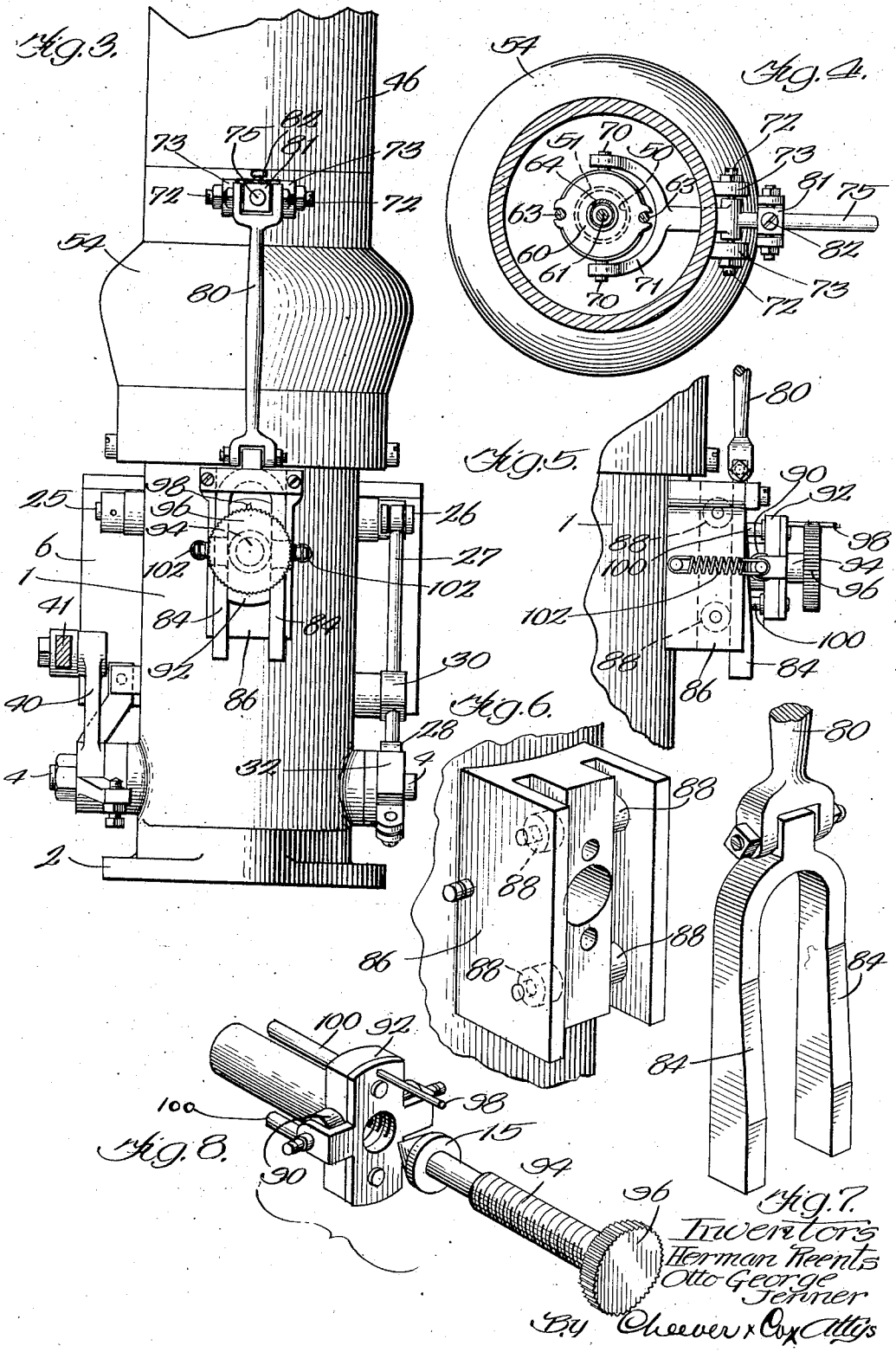
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CARBURETOR

Filed August 8, 1921. 2 Sheets-Sheet 2



Patented June 22, 1926. 1,590,059

UNITED STATES PATENT OFFICE.

HERMAN REENTS AND OTTO GEORGE JENNER, OF CHICAGO, ILLINOIS.

CARBURETOR.

Application filed August 8, 1921. Serial No. 490,577.

Our invention relates to carburetors and includes improvements in a carburetor of the general type shown in Tuerk Patent 963,187 issued July 5th, 1910. In that patent a tube is provided for directing a jet of air against the needle valve to increase the richness of the mixture at starting. One of our objects is to increase the efficiency of operation of this jet, and among other things we have provided a valve which tends to close the jet tube as the air flow (due to the engine attaining speed) increases.

Another object of our invention deals with the apportioning device by which the opening of the needle valve is increased as the air flow in the mixing chamber increases. Apportioning devices in themselves are known, but it is our purpose to improve the mechanism generally and also to provide means by which the ratio between the air flow and the valve opening may be regulated. According to the illustrated design the air stream impinges upon a plate located within the main duct and the movement of this plate is transferred to the valve through the medium of cam mechanism and also of lever mechanism, the leverage of which may be varied. Contributory objects will become apparent as the description proceeds.

A part of the mechanism herein shown, particularly the feed chamber and associated parts, forms the subject of a divisional application filed on the 22nd day of May, 1923, Serial No. 647,059.

In the accompanying drawings which illustrate one form of the invention,

Figure 1 is a general assembly view of the carburetor in central vertical section.

Figure 2 is a plan section on the line 2—2, Figure 1.

Figure 3 is an elevation looking towards the left in Figure 1.

Figure 4 is a plan section on the line 4—4, Figure 1.

Figure 5 is a side elevation of the cam mechanism which automatically regulates the opening of the needle valve.

Figure 6 is a perspective view of the guide blocks for the regulating cam.

Figure 7 is a perspective view of the regulating cam.

Figure 8 is a perspective view of the needle valve and parts wherein it is mounted.

Figure 9 is a fragmentary elevation showing a changed position of the throttle valve and connected mechanism for operating the element which controls the level of fuel in the float chamber. The view is taken in a direction opposite to that shown in Figure 1—that is, the view shows what would be the rear side of the mechanism shown in the lower portion of Figure 1.

Like numerals denote like parts throughout the several views.

In the form illustrated, the carburetor has a body 1 provided with a flange 2 by which it may be bolted or otherwise fastened to the intake manifold of an internal combustion engine. The main body portion forms a duct for conveying the atomized fuel to the engine and is provided with a throttle valve 3 fastened to a rock shaft 4 in the ordinary manner. A feed chamber 6 is formed at the side, and in the present design constitutes a part of the body of the device. It is furnished with an inlet screen 7 and contains a float 8 provided with a valve 10 which controls an aperture 11 in the bottom. These parts regulate the supply of fuel in the well known manner. Leading from the float chamber into the main passage of the carburetor is a duct 14, the discharge mouth whereof forms a seat for the needle valve 15. The mouth of this duct is centered in the passage for reasons which will hereinafter become apparent.

To now describe the mechanism for varying the level of liquid fuel in the float feed chamber 6: A controller body 20, which is here shown in the form of a ring surrounding the float 8, is so apertured as to be vertically slidable upon three upright guide pins 21 surrounded by helical springs 22 on which the controller body rests. A yoke 24 is mounted over the controller body and its free ends engage the top thereof at diametrically opposite points, the result being that as the free ends of the yoke move downward they depress the controller body, thus causing the level of the liquid within the feed chamber to rise. The yoke is rigidly fastened to the rock shaft 25 journaled in the side walls of the feed chamber, as best shown at the central portion of Figure 2. This shaft is rocked by means of a lever 26 connected by a rod 27 to a tappet 28. Connecting rod 27 passes through and is guided by a stationary guide 30. Tappet 28 is actuated by a cam or arm 32 rigidly fastened to throttle shaft 4, as best shown in dotted lines in Figure 1 and in full lines in Figures

2 and 9. The construction is such that when shaft 4 is rotated to open the throttle the tappet is pushed upward, thus rotating rock shaft 25 in a direction to depress the free ends of the yoke 24 and cause a corresponding depression of the controller body 20. The rock shaft may be rotated by any suitable means, usually controlled manually, for example, a lever 40 rigidly fastened to the shaft and operated by a link 41 or other suitable means. These parts are shown near the bottom of Figure 2 and at the left side of Figure 3.

Referring now to the air inlet passage and the mechanism associated therewith and the means for controlling the needle valve: A duct 45 forms part of the body of the carburetor and serves to convey air to the passage within the part 1. Air is supplied to section 45 of the carburetor body by an intake 46 of any suitable design. A spider 48 is fastened within the air duct somewhat above the needle valve 15 and forms a support for a stationary air tube 50 shown in vertical section in Figure 1. Surrounding this tube and vertically slidable upon it is a sleeve 51 having near its upper end a by-pass valve 52 which forms the main air control valve. This valve is adapted to seat against an annular shoulder 53 in section 45. Said shoulder or seat faces downward and is located at the entrance or upper end of a flare 54 formed in the duct 45. The portion of the duct immediately surrounding the periphery of valve 52 is more or less vertical so that the valve does not produce much, if any, of an opening when it first starts to descend. The valve is normally held closed by a helical compression spring 56 which encircles sleeve 51 and rests upon spider 48. The construction is such that when the engine is at slow speed and is drawing a comparatively small volume of air down through the carburetor the spring 56 will hold the valve closed, but as the draft increases the valve will be gradually drawn down and the air will pass around the edge of the valve instead of all passing down through the center tube 50. Valve 52 may hence be termed a "by pass valve". At the beginning the downward movement of the valve will permit the passage of little if any air around it, but after the initial movement the space increases rapidly owing to the flare 54, and hence a large air space is afforded. When the air flow or draft reaches a certain intensity it closes tube 50 altogether, the closure being effected by a disc-like supplemental valve 60 adapted to close the upper end of the tube. This latter valve is swiveled to the lower end of a stem 61 which is vertically slidable in a bar 62 held rigid by rods 63 as shown at the upper end of Figure 1. These rods are fastened to and move vertically with sleeve 51 and valve 52. A cushioning spring 64 is interposed between valve 60 and rod 62. Stem 61 is threaded and works within a nut 66 which rests upon bar 62. The stem has a knurled head 67 at its upper end. The result is that by rotating the head 67 and stem 61, valve 60 will be raised or lowered relatively to bar 62 and will close the top of the tube 50 sooner or later than it otherwise would when valve 52 descends.

The vertical movement of the by-pass valve 52 is taken advantage of to control the needle valve 15, and the mechanism by which it is accomplished will now be described:

Projecting from diametrically opposite points of the sleeve 51 near the upper end thereof are two pins 70 shown in plan in Figure 4. These pins project into the bifurcated end of a yoke lever 71 which is fulcrumed upon screw points 72 mounted in brackets 73 projecting from the side of section 45 of the body of the carburetor. An arcuate rod 75 forms an extension of the lever 71. Differently stated, the parts 71, 75 form a lever fulcrumed on the screw points 72 and move in synchronism with the vertical movement of the valve 52. A connecting rod 80 has a head 81 at the upper end which is slidable along the arcuate extension 75 and is provided with a set screw 82 by which it may be fixed in any desired position along the extension. At the lower end this rod is pivotally connected to a yoke shaped cam 84, as shown on an increased scale in Figure 7. As this rod may be rotated about its pivot it may be properly referred to as a "radius rod." Cam 84 slides in a channeled guide block 86 shown in side elevation in Figure 5 and in perspective in Figure 6. At the base of the channels in block 86 are antifriction rollers 88 for permitting the cam to be easily moved. The beveled faces of the cams 84 engage rollers 90, shown, for example, in Figure 5, and in perspective in Figure 8. Said rollers are mounted on a flanged sleeve 92 which is slidably mounted in the side of the carburetor body coaxially with the threaded portion 94 of the stem of needle valve 15. The sleeve is internally threaded to cooperate with the threaded portion of the stem, and hence by rotating the stem the valve may be adjusted relatively to it. To facilitate rotating the stem in the sleeve, the stem is provided with a disc 96 having a fluted periphery adapted to cooperate with the spring detent 98 fastened to the flange of the sleeve. The construction is such that the rod forms a yielding lock for preventing accidental rotation of the stem. To prevent rotation of the sleeve horizontal guide pins 100 are provided. These are shown in Figures 1, 8 and elsewhere. The sleeve and needle valve are constantly urged inward by

tension springs 102, shown, for example, in Figures 2 and 5. Thus it will be evident that as the yoke shaped cam 84 rises consequent upon the descent of by-pass valve 52, the sleeve 92 and needle valve 15 will be forced away from the feed tube 14. Thus increasing the opening at the needle valve and permitting an increased flow of fuel into the main passage of the carburetor.

It is desirable to provide means for breaking up any liquid drops that may issue from the mouth of the feed tube, and for this purpose we have provided a cup 110 and diffusers 112 within the main passage below the needle valve.

In operation: The float 8 normally keeps the level of the fuel below the level of the feed tube 14 when the throttle 3 is closed, as shown in Figure 1. If, now, the operator wishes to start the engine he opens the throttle, thus moving the parts from the position shown in Figure 1 to the position shown in Figure 9. This movement causes the free end of the yoke to descend and depress the controller body 20. This raises the level in the float feed chamber 6 until the fuel is able to flow through the feed tube 14 to the needle valve. At first, as the engine runs slowly, the draft through the carburetor is weak, but as valve 52 remains closed, the air flow is concentrated in tube 50 thus producing a jet of air directly on the needle valve and thus pulling sufficient fuel from the supply tube 14 to produce the necessary richness of mixture. As the engine speeds up, the draft increases and the by-pass valve commences to descend. At first, the downward movement of the valve is substantially without effect owing to the fact that for a slight distance below shoulder 53, the sides of the carburetor closely approach the rim of the valve. Shortly afterward, however, as the valve continues to descend, the size of the opening increases rapidly due to the bulge of the casing at this point, so that at ordinary running speeds, a large proportion of the cross-section of the casing is available for the passage of air. Finally, at maximum speed, the valve 60, which moves in unison with the by-pass valve 52, closes the upper end of the tube 50 altogether. The needle valve is thereupon to a certain extent protected from the draft and a weaker mixture is produced.

In view of the foregoing it will be observed that, in starting, the draft is concentrated at the needle valve thus producing an especially rich mixture, whereas, for the higher speeds, first the draft is more or less uniform over the entire cross-section of the duct and at maximum speeds is diverted more to the walls of the duct thus producing a gradually decreasing richness of mixture. To maintain high speed, however, especially under a full load, an additional quantity of fuel is necessary and this need is automatically supplied in our device by the mechanism which controls the position of the needle valve. As the by-pass valve 52 descends, it rocks lever 71 about its pivotal support, thus raising the arcuate extension 75, raising the connecting rod 80 and cam 84, and thus moving the needle valve open in opposition to the tension of the springs 102. The cam is thicker at the bottom than at the top and the parts are so arranged that as the cam rises it acts upon the rollers 90 mounted on the sleeve 92 and thus draws the sleeve outward from the carburetor and increases the opening at the needle valve. If an enhanced action of this kind is desired the set screw 82 at the upper end of the connecting rod 80 is loosened and the block 81 is moved farther away from the fulcrum of the rocking lever, thus altering the movement of the connecting rod and cam for any given movement of the by-pass valve 52. In addition to the above regulation we have provided hand regulation, and the needle valve may be set normally closer to or farther from its seat by rotating hand wheel 96 in the proper direction.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. A carburetor having a mixing chamber with a needle valve therein for controlling the fuel supply, an outer tube leading to the mixing chamber for conveying air to it, an inner tube located concentrically within the outer tube, the needle valve being located in line with the inner tube at the downstream end thereof, a bypass valve in the form of a disc normally closed and located in the outer tube surrounding the inner tube, the outer tube having a seat for the bypass valve and the walls of the outer tube diverging downstream from said valve seat, and a supplemental valve normally open for closing the inlet to the inner tube, the bypass valve and supplemental valve being connected together to operate in unison, whereby the supplemental valve moves toward closed position as the bypass valve moves toward open position, the bypass valve being located upstream from the needle valve whereby air passing around the bypass valve may thereafter reach the needle valve.

2. A carburetor having a mixing chamber with a needle valve therein for controlling the fuel supply, an outer tube leading to the mixing chamber for conveying air to it, an inner tube located concentrically within the outer tube, the needle valve being located in line with the inner tube at the downstream end thereof, a bypass valve in the form of a disc normally closed and located in the outer tube surrounding the inner tube, the outer tube having a seat for the bypass valve and

the walls of the outer tube diverging downstream from said valve seat, and a supplemental valve normally open for closing the inlet to the inner tube, the bypass valve and supplemental valve being connected together to operate in unison, whereby the supplemental valve moves toward closed position as the bypass valve moves toward open position, the bypass valve being located upstream from the needle valve whereby air passing around the bypass valve may thereafter reach the needle valve, the bypass valve being located downstream from the supplemental valve whereby when the latter is closed all the air is forced to pass outside of the periphery of the bypass valve.

3. A carburetor having a mixing chamber with a needle valve therein for controlling the fuel supply, an outer tube leading to the mixing chamber for conveying air to it, an inner tube located concentrically within the outer tube, the needle valve being located in line with the inner tube at the downstream end thereof, a by-pass valve in the form of a disc normally closed and located in the outer tube surrounding the inner tube, the outer tube having a seat for the bypass valve and the walls of the outer tube diverging downstream from said valve seat, and a supplemental valve normally open for closing the inlet to the inner tube, the bypass valve and supplemental valve being connected together to operate in unison, whereby the supplemental valve moves toward closed position as the bypass valve moves toward open position, the bypass valve being located upstream from the needle valve, the supplemental valve being axially adjustable relatively to the bypass valve whereby its timing may be varied.

4. A carburetor having a mixing chamber with a needle valve therein for controlling the fuel supply, an outer tube leading to the mixing chamber for conveying air to it, an inner tube located concentrically within the outer tube, the needle valve being located in line with the inner tube at the downstream end thereof, a bypass valve in the form of a disc normally closed and located in the outer tube surrounding the inner tube, the outer tube having a seat for the bypass valve and the walls of the outer tube-diverging downstream from said valve seat, a supplemental valve normally open for closing the inlet to the inner tube, the bypass valve and supplemental valve being connected together to operate in unison, whereby the supplemental valve moves toward closed position as the bypass valve moves toward open position, the bypass valve being located upstream from the needle valve, the supplemental valve being axially adjustable relatively to the bypass valve whereby its timing may be varied, and means for cushioning the supplemental valve whereby the seating of it against the end of the inner tube will not limit the closing movement of the bypass valve.

In witness whereof, we have hereunto subscribed our names.

HERMAN REENTS.
OTTO GEORGE JENNER.