Aug. 27, 1968 J. A. BASCLE, JR 3,398,938

CARBURETOR AND INLET MANIFOLDS FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 10, 1967 3 Sheets-Sheet 1

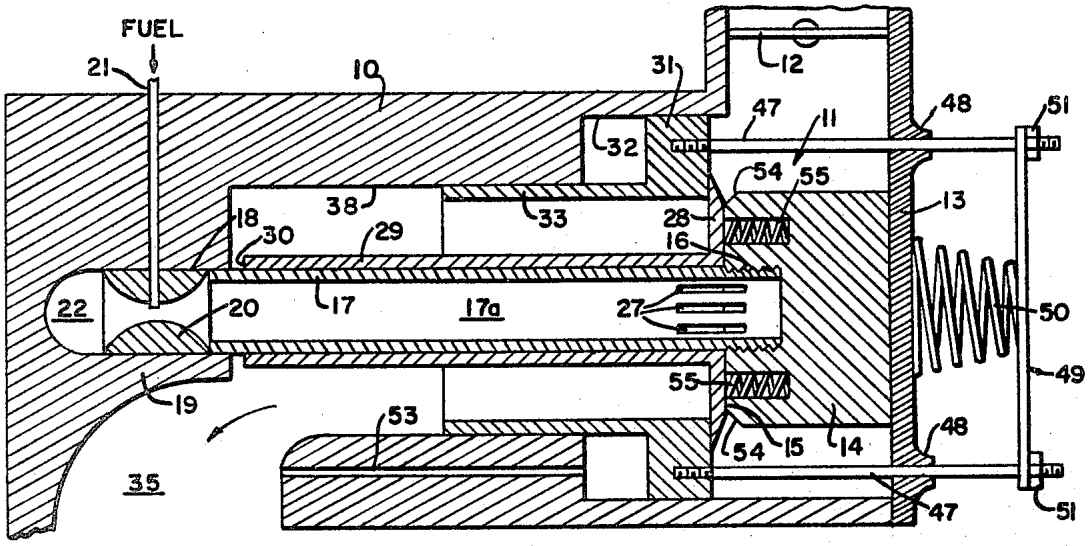

FIG. 1.

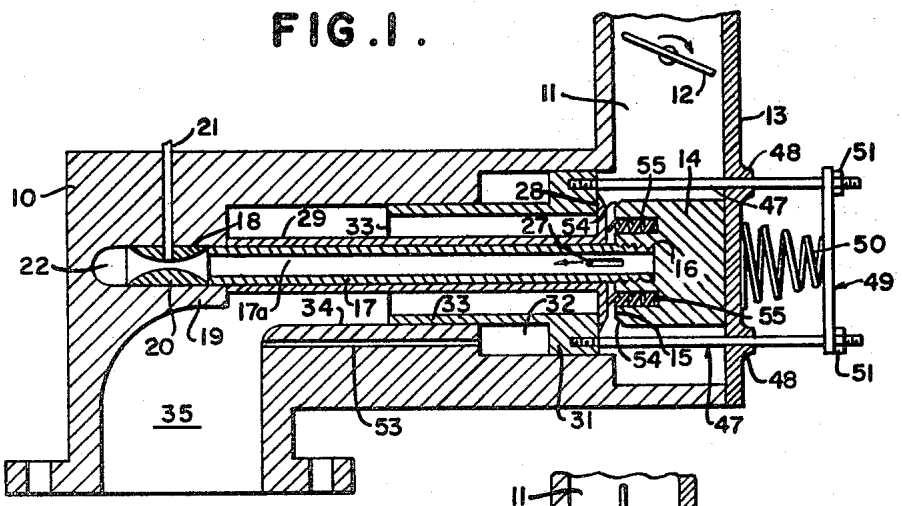

FIG. 2.

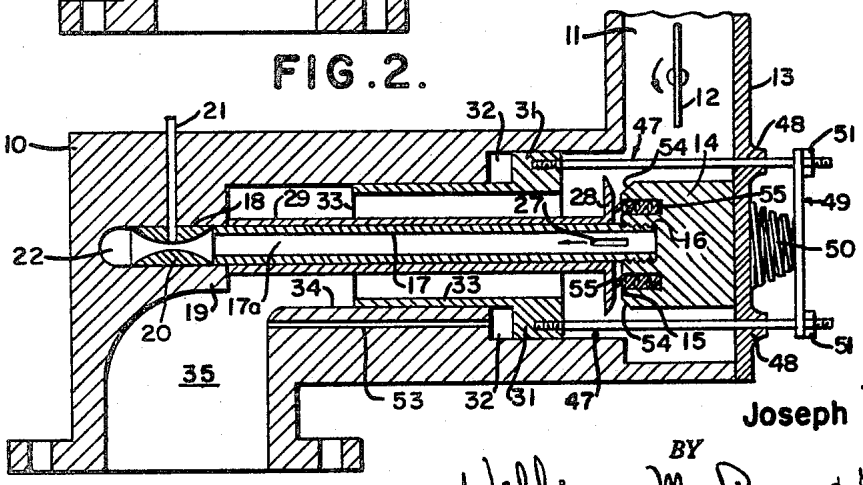

FIG. 3.

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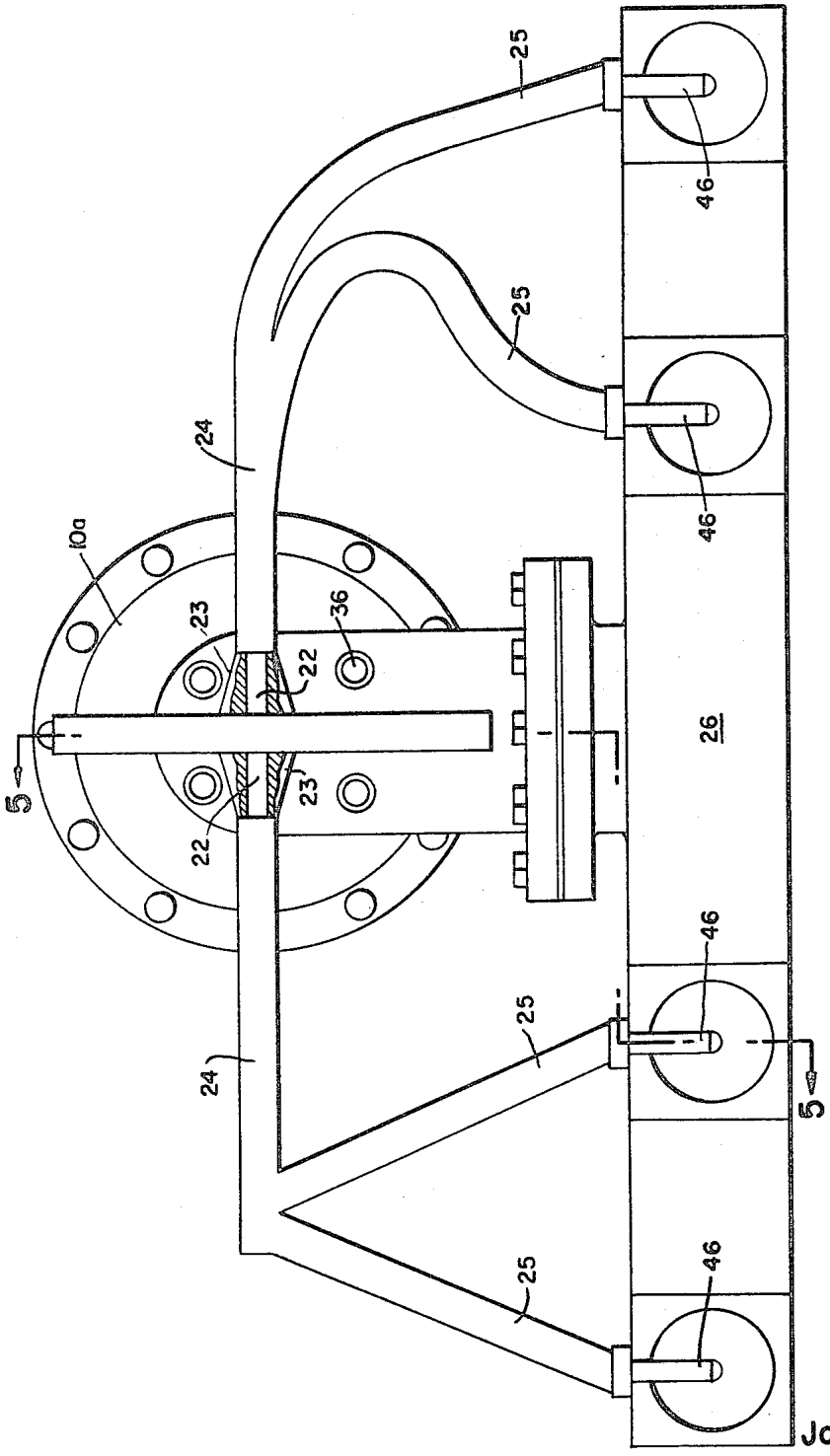

FIG. 4.

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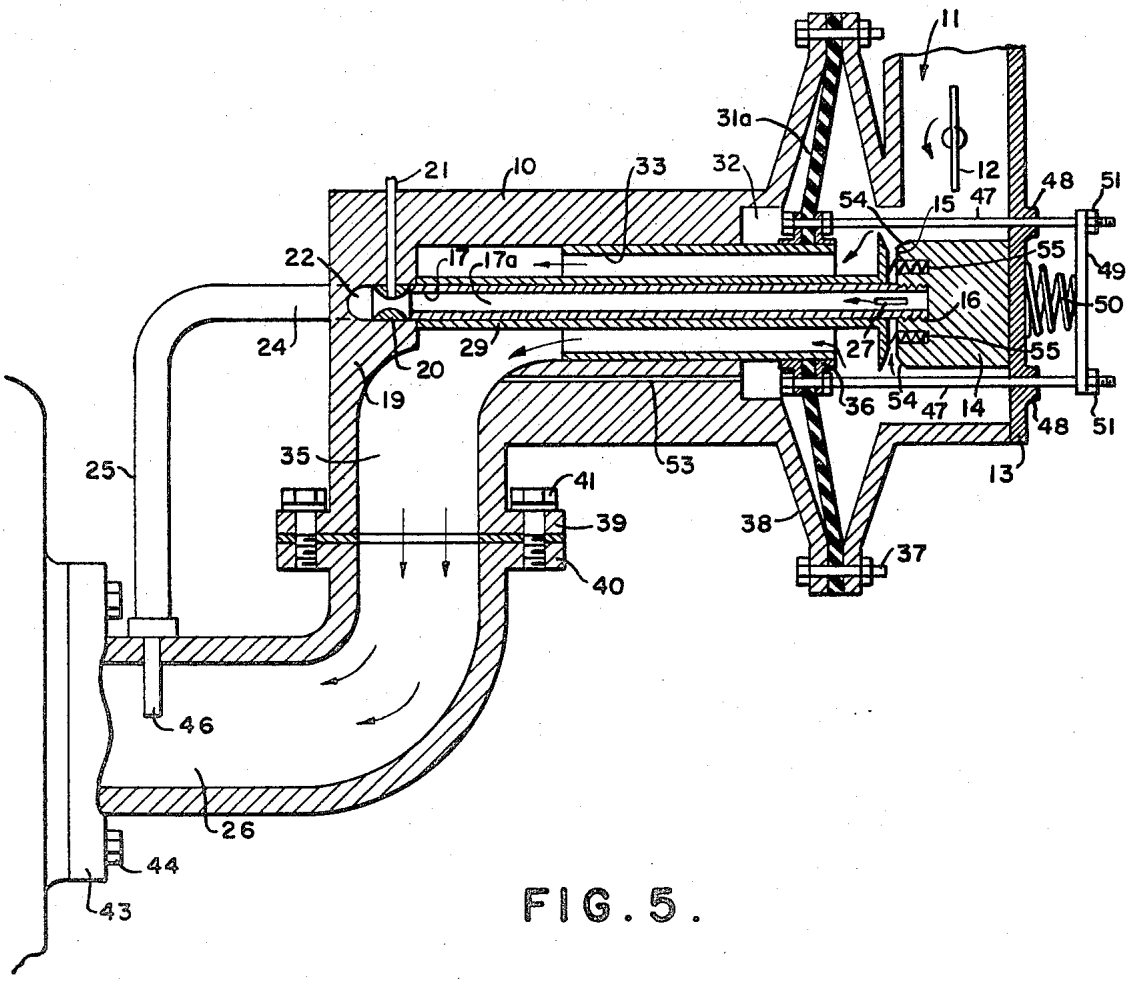

FIG. 5.

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3,398,938

CARBURETOR AND INLET MANIFOLDS FOR INTERNAL COMBUSTION ENGINES

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Continuation-in-part of application Ser. No. 610,425, Jan. 19, 1967. This application Oct. 10, 1967, Ser. No. 674,218

9 Claims. (Cl. 261—46)

ABSTRACT OF THE DISCLOSURE

The disclosure herein shows one form of the invention embodying a conventional manifold of an internal combustion engine on which is superimposed an additional manifold with a duplex carburetor valve arrangement whereby on opening the throttle valve, both duplex valves will be automatically moved under engine suction conditions to first open a high-velocity restricted fuel-air supply to the additional manifold to subserve initial fuel-air requirements of an idling or slow speed engine: A second valve from the duplex arrangement being subsequently opened to open a secondary air channel to the conventional manifold for the supply of additional air to balance the mixture for medium and high-speed engine operation.

The present invention relates to Carburetor and Inlet Manifolds for Internal Combustion Engines, and the application is a continuation-in-part of my prior application similarly entitled, Ser. No. 610,425, filed Jan. 19, 1967, now abandoned.

The main object of the invention is to obtain desired pressure-sensitive reactions through an arrangement of valve means to provide improved induction principles when applied to carburetors and manifolds for internal combustion engines.

A further object of the invention is to provide cooperative spring attachments for said valves to progressively open and/or close such valves under pressure differences created by movement of the throttle air-valve as opposed to the vacuum created by piston-type engines.

A further object of the invention is to provide an initial and limited operation of one valve to introduce air and fuel mixtures through a restricted, high-velocity distributing manifold independently of the main or conventional inlet manifold. This unique operational feature is designed to accommodate those engine requirements from idling through medium-speed ranges.

A further object of the invention is to provide a sequential movement of a companion second valve to complement the action of the first valve by introducing additional air through an enlarged or conventional inlet manifold; thereby to supply the maximum air requirements of the engine from medium through high-speed operations.

The invention has for a further object certain improvements over my prior Patent 2,828,116, granted March 25, 1958, entitled Pressure Carburetors.

With the foregoing and other objects in view, the invention will be more fully described hereinafter and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

FIGURE 1 is a longitudinal view through a carburetor constructed in accordance with present invention showing the closed condition thereof.

FIGURE 2 is also a longitudinal sectional view showing the throttle partially open and the valve for the primary channel also partially open.

FIGURE 3 is also a similar view showing the throttle in the wide open position and the valves in similar wide open positions opening both primary and secondary channels for maximum air and air-fuel supply to the manifolds of the engine.

FIGURE 4 is a rear end view of the carburetor, a conventional manifold and the distributing system including an additional manifold according to the present invention.

FIGURE 5 is a logitudinal sectional view of a modified form of carburetor taken on the line 5—5 in FIGURE 4 looking in the direction of the arrows, and illustrating the connection of the distributing tubes of the additional manifold to the conventional manifold.

Referring more particularly to the drawings, **10** designates a main carburetor body having a conventional air intake **11** controlled by the customary throttle valve **12**. The removable front cover **13** of the throttle casing supports on its inner side an abutment block **14** having an inner flat surface serving as a valve seat **15**. Opening through the inner flat face of the abutment block is a threaded socket **16** for receiving the threaded forward end of an air tube **17**. Any other connection may be made between the tube **17** and the abutment block.

The rear end of the tube **17** is fitted into and supported by a channel wall **18** made in an internal projection **19** of the main carburetor body. In this channel **18** is also included a venturi block **20** supplied with fuel through a fuel tube **21** from a customary source. The discharge end of the tube **21** will be preferably at the area of greatest restriction of the venturi tube at which occurs the greatest air velocity. The venturi tube delivers to cross bores **22** of the carburetor body as shown more particularly in FIGURE 4. These cross bores deliver the air-fuel mixture through bosses **23** to distributing tubes **24** and branch tubes **25** delivering to discharge tubes **46** in the conventional inlet manifold **26**. The parts **22**, **23**, **24**, **25**, and **46** constitute the restricted high velocity distributing manifold.

An annular series of ports or slots **27** is made through a forward portion of the air tube **17**. These slots **27** extend lengthwise of the tube **17** at least rearwardly of the valve surface **15** of the block **14**. A valve disk **28** carried at the forward end of a tubular slide valve **29** fitted slidably over the air tube **17** has a limited movement axially of the tube as indicated by the clearance **30** between the rear end of the tubular slide valve **29** and the internal projection **19**.

A piston valve ring **31** is fitted to slide in a cylindrical recess **32** of the carburetor body oriented to forward and backward reciprocating motion and having inner portions thereof overlapping outer edge portions of the valve disk **28**, it being seen particularly from FIGURE 1 that the diameter of the valve disk **28** exceeds that of the block **14** so that there is an exposed forward outer circular portion of the disk which is at all times subject to throttle valve pressure when that valve is open to any extent.

V-shaped grooves **54** are provided between the block **14** and primary valve **28** at outer edge portions to facilitate the entrance or thrust of air between said members. To further assist the movement of the primary valve **28** away from the block **14** one or more coil or other springs **55** housed under compression in sockets in the block bear against the outer face of valve **28**.

The piston valve ring **31** is affixed at its rearward end to a cylindrical bearing sleeve **33** slidably mounted in a cylindrical section **34** of the carburetor body. If desired, suitable sealing rings may be provided between the peripheral edge of the piston valve ring **31** (also called secondary valve) and the inner wall of the cylindrical re-

cess 32. One or more bores 53 may be made in the carburetor body setting up free communication between the recess 32 and the secondary air channel 35 for the purpose of avoiding air accumulation and entrapment back of the piston valve ring 31, and to establish negative pressure on the rear face of piston valve ring 31.

Pursuant to the foregoing, a primary air-fuel channel is provided in which atmospheric air under control of the throttle valve is received and under control of the valve disk 28 and the tubular slide valve 29 is admitted through the slots 27 to the interior of the air tube 27, thence through the venturi block 20, picking up fuel therefrom and finally from the cross bores 22 to the distributing tubes 24 and 25 and the discharge ends 46 into the conventional manifold 26.

The carburetor also provides a secondary channel 35 for air incoming through the throttle valve, as shown in FIGURE 3, through the forward open end of the cylindrical bearing sleeve 33 when the secondary valve 31 is in the open position and thence down the secondary channel 35 also for delivery to the conventional manifold and engine.

A spring or other return means is provided for closing both primary valve 28 and secondary valve 31, which means is best seen in FIGURES 2 and 3 and comprises a coil spring 50 having one end seated against the outside face of the cover plate 13 and the other end engaging a cross bar 49 attached to rods 47 slidably mounted through guides or bosses 48 on the plate 13 and held in adjustable position thereon by nuts 51 threaded on outer ends of the rods to adjust the tension of the spring 50. The inner ends of the rods are affixed to the piston valve ring 31.

In operation, FIGURE 1 shows the normal position of the parts with the engine out of operation. In this view the spring 50 has shifted the secondary valve 31 to the extreme right hand position, entraining therewith the primary valve 28 with which it is overlapped to a closed position against the valve face 15 of the block 14. In this condition both valves 28 and 31 are closed, and no access may be had to either channel 17*a* or channel 35. In FIGURE 1 the throttle valve 12 is shown in closed position.

In FIGURE 2 the throttle valve 12 is shown as slightly opened, it being understood that the ignition has just been turned on and the engine is under idling conditions establishing a suction in the conventional manifold 26. This suction will result in throttle pressure on the right hand faces of both primary and secondary valves 28 and 31, causing the same to move to the left as shown in FIGURE 2. This first movement results in an opening of the primary valve 28 uncovering the ports 27 to incoming air under throttle control. This air passes through the diametrically restricted channel 17*a*, draws fuel from the fuel induction tube 21, passes through cross bores 22 and to the primary or smaller manifold consisting of the distributing tubes 24, branch tubes 25, and the nozzles 46, which as shown in FIGURES 4 and 5 project into the conventional manifold 26 and supply the air-fuel mixture essential to combustion and to the continued operation of the engine.

In the condition of FIGURE 2, the primary valve 28 and the secondary valve 31 are still closed together so that the entrance to the larger diameter air channel 35 is still closed off and no additional air is thus permitted at this juncture to the conventional manifold 26 or to the combustion chambers of the engine.

During this first opening movement, as represented in FIGURE 2, the closing or biasing spring 50 has been at least slightly compressed.

Referring to FIGURE 3, the throttle valve 12 has been shown as moved to full open position. The left end of tube 29 having already abutted at its left end against internal projection 19, the primary valve 28 has been arrested in movement. The combined greately increased suction in the engine and conventional manifold together with the positive pressure of incoming air through the throttle connection impinging against the right hand face of secondary valve 31 now causes that valve to move further over to the left, leaving the now immovable primary valve 28 still in the position of FIGURE 2 while opening the mouth of the air channel 35 between the primary and secondary valves 28 and 31. This FIGURE 3 shows substantially the high-speed running position of the valves. In this position larger quantities of atmospheric air admitted through the throttle 12 are supplied to the conventional manifold 26, while maximum quantities of air-fuel are supplied through channel 17*a* and through the primary or smaller manifold 24, 25 as shown in FIGURES 4 and 5.

If engine's speed is reduced by partial closing of the throttle valve 12, the spring 50 will gradually reassert itself and shift the secondary valve 31 back toward the right so that when the throttle 12 is finally closed, the spring 50 will move the secondary valve 31 to the right until it picks up the primary valve 28 and thereupon the two valves so entrained will be shifted back to the primary position shown in FIGURE 1, in which position both valves are closed and all access of air to either channel is shut off and the engine is stopped in action. This condition remains until the engine is again activated.

Similar considerations apply to the form of invention shown in FIGURE 5 in which the diaphragm 31*a* has supplanted the piston 31.

The springs 55 will, of course, be weaker than the main spring 50 so that the main spring 50 will exert superior force to close both primary and secondary valves when the throttle 12 is closed, as shown in FIGURE 1.

With the engine out of operation, the parts are in the positions of FIGURE 1. When the engine is started and the throttle valve opened, the secondary valve 31 will move to the left from the closed position from FIGURE 1, proportionately compressing the spring 50, as shown in FIGURES 2 and 3, and thus closing the bias from the primary valves 28, freeing the primary valve 28 to the opening action of its auxiliary springs 55 (FIGURES 2 and 3).

In FIGURE 1 the stronger spring 50 has over-ridden the weaker springs 55, closing both valves 28 and 31, a condition occurring in closing or substantial closing of the throttle 12.

When the throttle is moved from the position of FIGURE 1 to the position of FIGURE 2, the main spring 50 will yield to the force of air pressure against the right-hand or forward face of the secondary valve 31 plus the vacuum pull of the idyling engine in the secondary channel 35, which has access, through passage 53, to the rear face of the secondary valve 31.

As a consequence the secondary valve 31 will move to the left or rearwardly, followed closely by the primary valve 28 under the combined influence of the springs 55 and the throttle pressure acting against the forward face of the disc 28. This movement of the two valves will continue until the primary valve 28 is arrested in movement by its stop 30. Air is now being admitted to the high speed air-fuel channel 17*a*.

Under sustained or increased throttle pressure, the secondary valve 31 will then move rearwardly away from the primary valve 28 and open the valve port between the two valves, as shown in FIGURE 3, whereupon additional volumes of air are admitted to the larger secondary air channel 35 and to the conventional manifold of the engine. As shown in FIGURE 5, the supply of air through the secondary channel 35 moves past jets 46 from the high speed air-fuel channel just before passing into the engine.

The main spring 50 will be selected as of sufficient strength to move both valves 28 and 31 to closed positions, and in so doing to contract supplement springs 55.

Although I have disclosed herein the best form of the invention known to me at this time, I reserve the right to

all such modifications and changes as may come within the scope of the following claims.

I claim:

1. For use with an intake manifold of an internal combustion engine, a carburetor comprising:
(a) a body having a primary high-velocity cross-sectionally restricted air-fuel channel and a secondary larger-diameter air channel, both in communication separately with the manifold,
(b) separate primary and secondary valves biased to closed positions and positioned for controlling entrance of air under throttle regulation respectively to the primary and secondary channels,
(c) both said valves entrained to move together in opening and closing movements,
(d) said valves separable to open the mouth of the secondary channel when the primary valve is arrested in opening movement,
(e) means for so arresting the movement of the primary valve while allowing the continuation of movement of the secondary valve to open the secondary channel, and
(f) means for supplying fuel to the air fuel channel.

2. A carburetor as claimed in claim 1 in which
(g) said valves are overlapped with the forward face of the secondary valve lapping the rear face of the primary valve, and
(h) the bias load is applied to the secondary valve to maintain the valves together on opening movement until the primary valve is arrested in movement whereupon the suction on the rear side and the throttle air pressure on the forward side of the secondary valve will promptly move the latter valve rearwardly away from the arrested primary valve to open the secondary channel and in doing so overrides the bias load.

3. A carburetor as claimed in claim 1 further comprising
(g) a ported tube extending through at least a part of the secondary channel and forming at least a part of the primary high-velocity channel,
(h) a sleeve slidable axially over the ported tube for opening communication between the throttle-controlled air supply and the interior of the tube, and
(i) a disc head affixed to the tube and forming with the tube the primary valve.

4. A carburetor as claimed in claim 3 further comprising
(j) an abutment embodied in the carburetor body in the path of the rear end of its tube acting as the means for arresting the movement of the primary valve.

5. A carburetor as claimed in claim 1 further comprising
(g) a block in the carburetor body positioned forwardly of the primary valve affording a seat against which the primary valve closes,
(h) said primary valve having a part extending beyond the confines of the block and exposed to throttle inlet pressure tending to open the primary valve and becoming kinetic when closing restraint and bias is removed from said primary valve,
(i) and yieldable means for forcibly initiating the opening movement of the primary valve from its closed position when the secondary valve moves inwardly.

6. A carburetor as claimed in claim 1 in which said secondary valve comprises
(g) a cylinder in the carburetor body,
(h) said secondary valve being in the form of a plunger ring mounted to reciprocate in the cylinder having its front face exposed to throttle pressure and adapted to close against the primary valve closing the entrance to the secondary air channel, and
(i) means for setting up open communication between the rear portion of the cylinder and the negative pressure of the engine manifold.

7. A carburetor as claimed in claim 1 in which the biasing construction comprises
(g) a spring load, and
(h) means for applying the load to the secondary valve.

8. A carburetor as claimed in claim 7 further comprising
(i) means for adjusting the load.

9. A carburetor as claimed in claim 1 further comprising
(g) a supplemental manifold connected at its upstream end to the restricted air-fuel channel and at its downstream end to the first-named manifold.

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