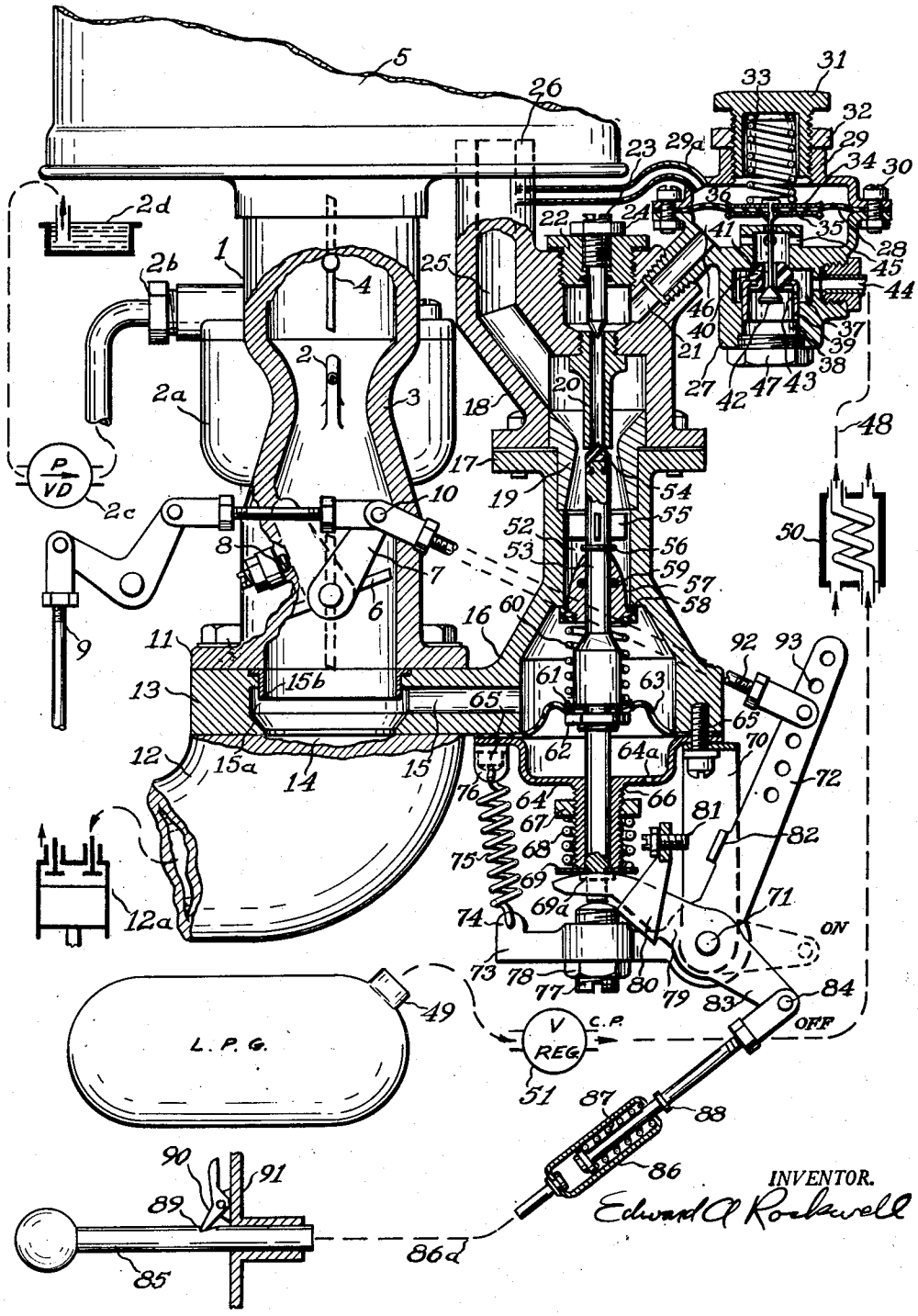
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SYSTEM OF AUXILIARY CARBURETION FOR INTERNAL-COMBUSTION ENGINES

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SYSTEM OF AUXILIARY CARBURETION FOR INTERNAL-COMBUSTION ENGINES

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My invention relates to improvements in carbureting apparatus used for forming the charge for operation of internal combustion engines of different types, and the object of my improvements is in an auxiliary carburetor to function in connection with a main carburetor to give a more effective fuel and air charge for the operation of the engine.

A further object of my invention is to provide an auxiliary carburetor which will properly proportion the distribution of the charge between the main carburetor and the auxiliary carburetor wherein a fuel of high octane rating is intermingled with air for raising the octane rating of the main fuel charge for use in high compression engines requiring a higher octane rating of the fuel during load conditions in the operation of the engine.

A further object is to provide a control and throttle arrangement for the auxiliary carburetor which is effective to conserve the use of the higher octane rated fuel by the improvements which effect a proportioning between the main carburetor and the auxiliary carburetor to substantially accord with the octane requirement of the engine throughout the throttle and load range of the engine.

A further object of my invention is in an apparatus to effectively utilize liquid petroleum gas, such as butane and/or propane and to provide an apparatus which will feed the liquid petroleum gas vapors to a jet in the auxiliary carburetor air stream at a predetermined slight pressure above the atmosphere so as to maintain a desired ratio of air to gas vapor throughout the throttle range of the auxiliary carburetor and whereby the liquid petroleum gas will be shut off when the throttle is closed.

A further object is to provide a counterbalanced throttle arrangement for the auxiliary carburetor which will remain closed at high levels of vacuum on the engine side of the throttle and in which the throttle will automatically open in the auxiliary carburetor at a predetermined low level of intake manifold vacuum but will not open beyond the point determined by the movement of the throttle of the main carburetor.

A further object is to provide a novel idle adjustment for the main carburetor in connection with the throttle of the auxiliary carburetor.

A further object is to provide a manual control for cutting in and out the auxiliary carburetor while permitting the operation of the main carburetor.

A further object is to provide a device in which

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the proportion of high octane mixture can be adjusted so as to accommodate the apparatus to the fuels used, as well as an apparatus which is adjustable according to the type of engine, that is to say, engines having different compression ratios so as to effectively receive the proper ratio of fuel by the octane requirement of the particular engine to which the apparatus is applied.

A further object is in the construction and arrangement of the auxiliary carburetor which can be readily applied to existing engines having standard carburetors.

A further object is to provide a main throttle stop position for the main carburetor which coacts with the manual control for maintaining the auxiliary carburetor out of action wherein if the apparatus is used on a high compression engine and in the case of the high octane fuel running out of supply the main throttle will not be permitted to open sufficiently wide and to thereby limit the compression of the engine so that the engine will run more readily on the lower octane fuel.

It is recognized that although premium gasoline on the market of only a few points of octane rating above the regular gasoline is not rated sufficiently high for the requirements of the efficient proposed new internal combustion engines, and also it is a recognized fact that these new engines, as well as the majority of engines in motor cars, require a premium grade of gasoline only during a small percentage of the average operating mileage due to the fact that engines are operated under part throttle most of the time or at a reduced compression. Therefore, the octane rating requirement for operating, for example, up to half throttle is even below the octane rating of the regular grades of gasolines now on the market. However, during acceleration and full load operation, even the premium grades have not sufficient octane rating to give the best results.

It is well known that there may be a shortage of premium grade gasolines, and at the same time, the premium grade gasoline is being wasted by not being utilized by the automobiles in use during perhaps as much as 95% of the time, and, although the use of liquid petroleum gas, such as butane and/or propane have been used in carburetors and combinations of carburetors, it is the ultimate object of my invention to make possible the utilization of only small amounts of the high octane fuels arranged to be carbureted in an auxiliary carubetor arrangement in conjunction with the main carburetor to give the most economical

and advantageous results, which should result in a conservation of the available supply of premium gasoline, and particularly for the reason that only a small quantity of the high octane fuel need be carried on the vehicle, which in large amounts might not be practical from the standpoint of available storage space on most vehicles.

While it has been proposed to use two different fuels of a high and a low octane rating in special carburetors, and I also recognize that butane and/or propane vaporizers and regulators have been in use with various arrangements of adapters to a main carburetor, it is one of the purposes of the invention described and claimed hereinafter to provide an auxiliary carburetor that can be supplied as an attachment to existing carburetors so that two fuels can be effectively utilized together at the same time in the adjusted desired proportions, resulting in both economy and maximum full load performance, and in the improved and practical arrangement to throw out of action the auxiliary carburetor by a simple apparatus and to maintain the auxiliary carburetor out of action at times when, for example, the fuel feed of the auxiliary carburetor has been exhausted so that the main carburetor can be operated effectively. It will be evident that the main carburetor may be adjusted to a maximum lean mixture while the auxiliary carburetor may be adjusted for a richer mixture for most effective acceleration and full load operation.

While my invention is capable of embodiment in many different forms, for example, it is evident that in place of the liquid petroleum high octane vapor gas supplied to the auxiliary carburetor, any arrangement for feeding liquid fuel to the jet would be within the spirit of my invention. For the purpose of illustration, I have chosen only one form illustrated in the accompanying drawing—

The drawing, which is a vertical section through the same, shows a main carburetor comprising a casing 1, which has the usual jet 2, float bowl 2*a* and the connection 2*b*, which receives fuel from a pump 2*c* and reservoir 2*d* for gasoline in the usual manner, Venturi tubing 3, choke 4, air cleaner 5, throttle valve 6, having a control lever 7, with the usual full throttle stop 8, and the usual clevis and throttle connections 9 to the accelerator pedal (not shown) and connected to the throttle clevis pin 10. The carburetor body has the usual flange 11, which, however, is connected to the intake manifold 12 of an internal combustion engine 12*a*, through an interposed annular flange member 13, having a bore 14, mating with the bore of the carburetor body 1, and having a lateral extending passageway 15 therein, having an annular nozzle 15*a*, formed by the skirt 15*b*, and this interposed member forming an adjacent auxiliary carburetor body 16, and having a flange 17 for mating with the air and fuel body casting 18, these castings 16 and 18 supporting within their bores a Venturi tube 19. There is a fuel jet 20 screw threaded into the casting 18. A passage 21 is formed in the upper part of casting 18, having a screw plug 22 providing an adjusting jet control screw 23, having a lock nut 24. An air passage 25 is provided in the body casting 18, having an extension 26, leading into the air cleaner 5. Screw threaded into the body casting 18 is a pressure regulator 27, which comprises a regulating diaphragm 28 of flexible material, clamped between the mating flanges of a cover portion 29 and the body portion 27 with screws 30. A balance tube 29*a* is connected to the cover plate and to the air inlet port 25. Adjustably threaded into the cover 29 is a spring retaining cup 31, having a lock nut 32 and a pressure regulating spring 33, the lower end of which bears on the diaphragm plate 34, which is fastened to the diaphragm by a similar plate 35 and held together by the valve stem 36. An annular fuel passage 37 is formed in the extension of a bore 38, which has a counterbalancing piston 39 for the rubber valve 40, which valve also has a passageway 41 through the same to permit the extension of the valve stem 36, thereby disposed within the passage with a small valve 42 attached to said stem. In the counterbalancing piston 39 there is a small passageway 43, a suitable outlet connection leading into the annular passage 37 at 44. The radial valve ports 45 for admission of gas to the control chamber 46 permit the passage of vapor from the connection 44 to the diaphragm control chamber 46. Screw threaded into the bore 38 is a closure plug 47. The dotted line 48, leading from the connection 44 to a connection on the higher octane liquid petroleum gas receptacle 49 has interposed therein a heat exchanger 50 and a pressure regulating reducing valve 51. The body 16 has an auxiliary fuel mixture passageway 52, which has sliding there within a fuel shutoff stem 53, having at the top portion thereof a resilient shutoff valve head 54. Vane guides 55 are provided on the stem 53 to maintain an axial alignment of the said stem. A stop ring 56 is positioned in very close proximity to the top of the tapered throttle valve 57, having a resilient positive valve seat 58 in the closed position thereof. This throttle member has a suitable packing ring 59, which permits sliding of the stem through the bore in the throttle. A spring 60 is of sufficient strength to hold valve seat 58 tightly closed. The spring 60 bears on the diaphragm plate 61, having a clamping nut 62, sealing the diaphragm 63 on the stem 53. A diaphragm cover 64, having an atmospheric vent 64*a*, is held in place by an annular flange with screws 65 threaded into the body and tightly clamping the diaphragm to the mating face of the body 16. A hub 66, having a screw thread thereon has an adjustable spring tension nut 67 reacting on a control spring 68. Fastened to the lower end of the stem 53 is a washer 69 retained by a lock washer 69*a*, which takes the reaction of the spring 68. A lever bracket mounting 70 is also held in place by the screws 65. At the lower portion of the bracket, there is provided a fulcrum for a pin 71 upon which is mounted the control lever 72, having an arm 73 and a fastening lug 74 for a tension spring 75, the other end of which is fastened to a spring clip 76, held in place by one of the screws 65. In axial alignment with the valve stem 53, there is an adjustable stop screw 77 with its lock nut 78 screw threaded into the arm 73. Disposed to one side of the lever 72 and arm 73 but bearing on the washer 69 in the position shown, there is a second lever 79, having integral therewith an extension 80 with an adjustable screw threaded stop 81, which is in alignment with an abutment 82 on the lever 72. The lever 79 has an arm 83 having a clevis pin connection 84 for a manual control device 85. Interposed in the mechanical connection 86*a* is a spring tension member 86, having a spring 87, a stop 88, the manual control 85 having a notch 89, adapted to register with the ratchet 90. This ratchet is fulcrummed to a fixed support 91. There is an

adjustable clevis pin and rod 92 connecting the lever 72 with the throttle lever 7, having connections with the lever 72 in any of the series of holes 93 in the lever 72.

The operation of the above described structure is as follows: In the position of the parts in the drawing, it is assumed that the auxiliary carburetor 16, 18, 64 is shown in the off position by the reason of the adjustment of the manual device 85, which has applied a tension by being pulled back manually into the notch 89 so as to effectively compress the spring 87 away from the stop 88.

Since the tension of the spring 87 is greater than the force of the spring 66, the fuel shut-off stem 53 will tightly shut off any pressure of fuel vapors in the nozzle 20 by the valve head 54. At the same time, the throttle valve will be tightly shut at 58 and the spring 60 is of sufficient strength to counterbalance any vacuum occurring on the engine side of the throttle at the idle position of the throttle in the position shown and the engine idling.

Now, it will be assumed that the engine is in operation and the main carburetor 1 is functioning in its usual manner, the throttle idle position of the valve 58 is adjusted to give the desired opening for idling on the particular engine on which the apparatus is installed by adjusting the screw 77 attached to the lever arm 73 which is held abuttingly against the fuel shutoff stem 53 by the pullback spring 75. The throttle rod 9 now may be moved throughout the range of the throttle of the main carburetor even though the lever 72 is connected to the throttle lever 7 by the link 92 for the reason that the previously described action of the manual control device 85 will maintain the throttle valve and jet closed, and the lever 72 and arm 73 will simply ride away from the abutment of the adjusting screw 77, and the return spring 75 will bring the throttle back to the stop idle position. It is apparent in this position that the main carburetor simply functions normally in the conventional manner with a full range of movement of the throttle 6, and, if the main carburetor is installed on an internal combustion engine of the type having a compression ratio requiring a higher octane rated fuel than is being used in the carburetor, such as when using a regular grade of gasoline, it may be found advantageous to prevent the full opening of the throttle valve 6, and, for this purpose, there is a stop position provided on the lever 79 by the adjusting screw 81, which can be adjusted to stop the throttle before the throttle lever reaches the stop screw 8 on the main carburetor which normally permits the full opening of the throttle. In this way, the driver is apprised of the fact that he has opened the throttle as wide as should be permitted for this high compression engine. However, in some installations, it will not be desired to utilize this stop position, and in that case, the stop will be adjusted sufficiently away from the abutment 82 on the lever 72 to permit the throttle to open completely to the stop position as determined by the set screw 8 on the main carburetor.

The liquid petroleum gas tank 49 is connected to the auxiliary carburetor by the connection 48 to the outlet 44 on the regulator body 27. The liquid petroleum gas, which has, for example, 100-octane rating, will flow by its own pressure through a suitable heat exchanger 50 and enter the annular passage 37 and then through the small opening 43 in the balance piston 39 and through the valve passage 41 in the resilient regulator valve 40, and then through the radial passages 45. The expanded liquid petroleum gas vapor will act on the under side of the diaphragm 28 and urge the valve 42 to close at a pressure determined by the adjustable control spring 33. This spring preferably has a very low rate and is of a value to maintain the gas pressure leading to the jet 20 at a constant pressure very slightly above atmospheric pressure. It will be noticed that there is a balancing tube 29a allowing atmosphere at the pressure in the filter to act on the top of the diaphragm 28. It is understood that the liquid petroleum gas, for example, is preferably reduced by the regulator valve 51 to a relatively low pressure above atmosphere, that is to say, somewhat below 5 p. s. i. gauge pressure before entering the carburetor regulator 27, 29.

The secondary valve 40 on the regulator is for the purpose of permitting larger flows at full engine demand while at the same time maintaining a constant pressure at the flow determined by the jet 20 opening, as determined by the adjusting screw 23. It is preferable to have a slight pressure head, such as an inch of water pressure on the jet 20 of the auxiliary carburetor 16, for the reason that it is desirable to have an instant flow of gas for acceleration, as well as to provide a compensating head. For example, if it were required to have a subatmospheric pressure to operate the regulator valve 27, 29, the mixture of high octane vapor would have the tendency to run rich at the full opening of the throttle 57, whereas by using a slight positive head at the jet 20, the adjusting screw 23 would necessarily be adjusted to restrict the flow at low velocities of air through the auxiliary venturi 19, and at high velocities the restriction would be sufficient to prevent undue enrichment of the mixture. The slight positive head also has the advantage of starting easily by providing a flow of gas vapor into the intake manifold 12 so as to avoid unnecessary choking of the main mixture from the regular carburetor, which is harmful to the engine and which causes undue oil dilution and wear of the cylinder walls.

If the ratchet 90 is pushed out of the way of the notch 89 and the manual control device 85 is pushed to the right manually, which may be before the engine is started and after the spring device 86 and 87 hits the stop 88, the linkage 86a will be effective to move the lever 83 and lever arm 79 to the "on" position shown in dotted lines on the drawing, and it will be noticed that in this position the force of the spring 68 normally will open both the jet 20 and the throttle valve 57 in the auxiliary carburetor only when the throttle is moved to open position. Instantly liquid petroleum gas vapors will flow down into the auxiliary carburetor and past the annular control area around the throttle and through the passage 15 into the annular space 15a and then into the manifold 12. In other words, before starting the engine, the operator can push down the accelerator for a few seconds, and in this way the motor will be able to start on liquid petroleum gas vapors which will readily start the engine. As soon as the engine starts, there will be a high vacuum created on the engine side of the throttle, and since effective area of the diaphragm 63 is greater than the area of the throttle valve 57, the throttle valve 57 will be closed and the liquid petroleum gas shut off, as well as the throttle valve being maintained

tightly seated on the annular resilient seat 58. The tension of the spring 60 is sufficient to hold this valve seated against the idle vacuum. The size of the Venturi throat 19 is selected, for example, at the wide open adjusted throttle position of the main carburetor, as indicated in dotted lines in connection with the stop 8 and the position of the auxiliary carburetor throttle by the link 92 to permit, for example, as much as half, and in some cases more, liquid petroleum mixture of vapor and air as compared to the mixture of gasoline and air from the main carburetor, so that when these two mixtures are intermingled in the intake manifold, there will be an increased average octane rating of fuel mixture charge entering the engine. However, it is desired to conserve as much of the amount of high octane fuel as the octane rating of the gasoline used in the regular carburetor permits, and, for this purpose, my invention provides a means to vary at a predetermined desired proportion of mixture from the auxiliary carburetor to the main carburetor by reason of the contour of the throttle 57 affecting the annular opening thereof and by the holes 93 provided in the lever 72 for connecting the link 92. For example, in the top hole in the movement of the throttle of the main carburetor, the lever 72 will move to a lesser degree in proportion to the main throttle opening than if the connecting link 92 is connected to the bottom hole of the said lever. Since it is contemplated that this apparatus can be readily applied to existing installations, this adjustment can be easily made to suit the particular engine and fuel which is to be used. Furthermore, there is an adjustment provided for determining at what point in the intake manifold depression the auxiliary carburetor cuts in. The spring 68 is selected with a suitable rate to permit the adjustment of the same to control at what time, due to manifold vacuum, the throttle will commence to open along with the jet control of the auxiliary carburetor, for example, at a depression of the manifold of 4 to 3 inches Hg of vacuum, it will balance the spring 68 by the differential of pressure acting on the effective area of the diaphragm 63. However, it will be apparent that any time after this particular vacuum is reached that the throttle valve will not open beyond the position established by the main throttle by reason of the link 92 in its selected adjusted position in the holes 72 so that the minimum required proportion will be maintained. The adjusting nut 73, for example, would be adjusted to increase the tension of the spring 68 on the higher compression motors, and it would be adjusted to decrease the tension of the spring on the lower compression motors in order to give the higher octane fuel mixture in proper proportion to the regular carburetor mixture for the requirement of the particular engine.

It is quite evident that a liquid fuel could be pumped into the regulator with a suitable jet size selected in the case where a high octane liquid fuel is used in the place of the liquid petroleum gas. When an automobile is going down a grade with the throttle closed, a higher vacuum may be present in the manifold on the engine side of the throttle. Air can pass the auxiliary throttle by reason of the spring 60 being just strong enough to maintain the throttle closed at idle, which may permit air but not gas to flow through the auxiliary carburetor into the manifold, which will have the effect of saving gasoline consumption of the main carburetor under these no load conditions of operation.

The strength of the pullback spring 75 on the lever 73 is sufficient to overcome the value of the spring 68 in any of its adjusted positions, even when the engine is not running, so that the fuel vapors of the auxiliary carburetor will be maintained shut off. The air passage 25 can terminate in its own air cleaner, if desired, but since the apparatus is in close proximity to the main air cleaner, a suitable opening through the air cleaner is provided to permit the extension of the air opening into the cleaner which already is provided for the main carburetor.

As an illustration of the proportion of the mixture of the high octane fuel to lower octane fuel in the main carburetor, it can be assumed, for example, that half may come from the main carburetor and half from the auxiliary carburetor, it being understood that the actual scale proportions on the drawing could be adjusted to give any desired proportions at full load open throttle, and if the fuel being used in the main carburetor had an octane rating of 80 octane numbers, and the fuel mixture distributed from the auxiliary carburetor had 100 octane numbers, there would be a total octane rating of the mixture of 90 for utilization in the engine, which is above the rating of the usual premium fuels available, and, if a premium fuel was used, and with 100-octane rating of the liquid petroleum gas, there would be proportionately higher octane rating of the combined mixtures. However, from 90 to 95 per cent of the time in the average mileage run by motor vehicles, the manifold depression does not average a low enough depression to permit the higher octane fuel to be used except during acceleration and load operation, so that a small supply of the liquid petroleum gas is all that will be necessary to carry on most vehicles. The heat exchanger 50 can be of any type, such as for example, from exhaust gases or heated by the cooling water of the engine.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of the same.

I claim:

1. In a carbureting apparatus for use with an internal combustion engine, comprising manually operated separate means to control separate charges of air and fuel, including means to combine the said charges for utilization in the engine, and an additional control element therefor, having a lost motion located between the separate means and including additional means, movable independently of said first mentioned means, to operate the same, said control means including throttle valves for the separate charges having an operatively movable connecting means between the same for enabling at least one of the valves to move through a complete range of movement in the operation thereof and so as to provide for another of the valves at times a range of movement the same as the movement of the other said valve by means of said operative connection but merely at such times as determined by said additional control element in the operation thereof.

2. In a carbureting apparatus for use with an internal combustion engine, comprising manual means to control separate means for the control of separate charges of air and fuel including means to combine the said charges for utilization

in the engine, and an additional control element having a lost motion located between the separate means and having an additional manual control means, movable independently of said first mentioned means, operatively connected therewith, said control means including throttle valves for the separate charges having an operatively movable connecting means between the same for enabling at least one of the valves to move through a complete range of movement in the operation thereof and so as to provide for another of the valves at times a range of movement the same as the movement of the said other valve by means of said operative connection but merely at such times as determined by said additional control element in the operation thereof.

3. In a carbureting apparatus for use with an internal combustion engine, comprising manually operated separate means to control separate charges of air and fuel including means to combine the said charges for utilization in the engine, and an additional control element having a lost motion located between the separate means and having also a fluid pressure response area connected therewith and whereby the same is affected at the time of its movement by an operative condition of the engine, said control means including throttle valves for the separate charges having an operatively movable connecting means between the same for enabling at least one of the valves to move through a complete range of movement in the operation thereof and so as to provide for another of the valves at times a range of movement to accord with the movement of the said other valve by means of said operative connection but merely at such times as determined by said additional control element in the operation thereof.

4. In a carbureting apparatus for use with an internal combustion engine, comprising manually operated separate means to control separate charges of air and fuel including means to combine the said charges for utilization in the engine, and an additional control element therefor, having a lost motion located between the separate means and including additional means, movable independently of said first mentioned means, to operate the same, said control means including throttle valves for the separate charges having an operatively movable connecting means between the same having a selectively adjustable element thereon to predetermine the relative rate of movement between the valves for enabling at least one of the valves to move through a complete range of movement in the operation thereof and so as to provide for another of the valves at times a range of movement the same as the movement of the said other valve by means of said operative connection but merely at such times as determined by said additional control element in the operation thereof.

5. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising manually operated separate means to control separate charges of air and fuel including means to combine the said charges for utilization in the engine, an additional control element therefor, said control means including throttle valves for the separate charges at least one of which is adapted to have a complete range of movement in the operation thereof, and the other of said valves having also a pressure responsive element connected therewith and subject to the difference between the pressure in the manifold and the atmosphere to provide a controlled movement of the valve according to an operative condition of the engine as determined by said difference of pressure, said additional control element comprising a connection for selectively stopping the movement of the other of said valves towards its closed position.

6. In a carbureting apparatus, for use with an internal combustion engine having an intake manifold, comprising separate means to control separate charges of air and fuel formed from separate fuels respectively, including means to combine the said charges for utilization in the engine, an additional control element therefor, said control means including throttle valves for the separate charges at least one of which is adapted to have a complete range of movement in the operation thereof, and the other of said valves having a pressure responsive element connected therewith and subject to the difference between the pressure in the manifold and the atmosphere to provide a controlled movement of the valve according to an operative condition of the engine as determined by said difference of pressure, said additional control element comprising a connection for selectively stopping the movement of the other of said valves towards its closed position by a manually moved member coacting therewith to maintain the selective position.

7. In a carbureting apparatus, for use with an internal combustion engine having an intake manifold, comprising separate means to control separate charges of air and fuel formed from separate fuels respectively, including means to combine the said charges for utilization in the engine, an additional control element therefor, said control means including throttle valves for the separate charges at least one of which is adapted to have a complete range of movement in the operation thereof, and the other of said valves having a pressure responsive element connected therewith and subject to the difference between the pressure in the manifold and the atmosphere to provide a controlled movement of the valve according to an operative condition of the engine as determined by said difference of pressure, said additional control element comprising a connection for selectively stopping the movement of the other of said valves towards its closed position by a manually moved member coacting therewith to maintain the selective position comprising a spring tension device located between the manual member and the said additional control element.

8. In a carbureting apparatus for use with an internal combustion engine having an intake manifold comprising manually operated separate means to control separate charges of air and fuel formed from separate fuels having relatively low and high octane ratings respectively including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges and a mechanical positive acting proportioning device connecting the valves, having also a pressure responsive movable wall, providing lost motion between the said valves, providing a definite ratio of the high octane charge to the low octane charge determined through the throttle range of movement of at least one of the said valves.

9. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising manually operated separate means to control separate charges of air and fuel

formed from separate fuels having relatively low and high octane ratings respectively including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges, and a mechanical positive acting proportioning device connecting the valves, having also a pressure responsive movable wall, providing lost motion between said valves, including an element coacting therewith having a selective proportioning device, providing a definite ratio of the high octane charge to the low octane charge determined through the throttle range of movement of at least one of the said valves.

10. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising manually operated separate means to control separate charges of air and fuel formed from separate fuels having relatively low and high octane ratings in main and auxiliary carburetors respectively including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges, and a mechanical positive acting proportioning device connecting the valves, whereby a definite ratio of the high octane charge to the low octane charge in said auxiliary and main carburetors respectively can be determined through the throttle range of movement of at least one of the said valves, and an adjustable end position stop for the low octane valve at the closed position of the high octane valve and included in the connection between the valves, setting the idle open position of the low octane valve into a limited movable position by the fully closed position of the high octane valve.

11. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising separate means to control separate charges of air and fuel formed from separate fuels having relatively low and high octane ratings respectively including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges and a high octane fuel shutoff valve adapted to substantially shut off simultaneously with the closed position of the high octane throttle valve and a mechanical positive acting proportioning device connecting the throttle valves, whereby a definite ratio of the high octane charge to the low octane charge can be determined through the throttle range of movement of at least one of the said valves, and an end position stop for the low octane valve at the closed position of the high octane valve, comprising an independently adjustable element, included in the connection between the throttle valves, whereby the idle open setting of the low octane throttle valve is adjusted into a limited movable position by the fully closed position of the high octane throttle and shutoff valve.

12. In a system for intermingling two separate fuel to air mixture charges formed from different fuels of low and high octane rating respectively for use in an internal combustion engine and having a separate reservoir for each of the said fuels, the reservoir for the higher octane rating fuel being relatively smaller, comprising separate mixing tubes and jets for the respective fuels and for each a fuel feed connection including means to feed fuel between the reservoir and the jet, whereby the separate mixing tubes are effective to proportion the air and fuel in the proximity of the respective jets for intermingling with the respective fuels to form charges for utilization in the engine, throttle valves for controlling the degree of opening for admitting the charges to the engine and a passageway for intermingling the charges for combining the same at a point beyond the said throttle valves and between the engine and the said throttle valves, a manually controlled throttle connection for operating both of said valves, and a separately operable manually controlled proportioning device manually initiated independently of said manually controlled throttle connection coacting with the throttle connection effecting the consumption of a lesser proportion of the high octane fuel than the low octane fuel.

13. In a system for intermingling two separate fuel to air mixture charges formed from different fuels of low and high octane rating respectively for use in an internal combustion engine, a reservoir for a low octane fuel, a reservoir for a high octane fuel, separate mixing tubes and jets for the respective fuels and for each a fuel feed connection including means to feed the fuel between the reservoir and the jets, whereby the separate air tubes are effective to proportion the air and fuel in the proximity of the respective jets for intermingling with the respective fuels to form charges for utilization in the engine, throttle valves for controlling the degree of opening for admitting the charges to the engine and a passageway for intermingling the charges for combining the same at a point beyond the said throttle valves, and between the engine and the said throttle valves, a manually controlled throttle connection for operating both of said valves and a mechanical proportioning device coacting therewith for effecting the utilization of a lesser proportion of the high octane fuel than the low octane fuel, said high octane fuel jet having a shutoff valve adapted to be opened by the manually controlled throttle connection and located in the connection between the said throttle valves.

14. In a system for intermingling two separate fuel to air mixture charges formed from different fuels of low and high octane rating respectively for use in an internal combustion engine, a reservoir for a low octane fuel, a reservoir for a high octane fuel, separate mixing tubes and jets for the respective fuels and for each a fuel feed connection including means to feed the same between the reservoir and the jets, whereby the separate air tubes are effective to proportion the air and fuel in the proximity of the respective jets for intermingling with the respective fuels to form charges for utilization in the engine, throttle valves for controlling the degree of opening for admitting the charges to the engine, and a passageway for intermingling the charges for combining the same at a point beyond the said throttle valves and between the engine and the said throttle valves, a manually controlled throttle connection for operating both of said valves, a separately operable proportioning device coacting with the throttle connection for effecting the utilization of a lesser proportion of the high octane fuel than the low octane fuel, the said means to feed the fuel to the high octane jet having an element for maintaining a slight superatmospheric pressure of fuel on the jet and a shutoff valve adapted to be opened by the manually controlled throttle connection whereby high octane fuel will flow upon movement of the throttle to facilitate the starting of the engine.

15. In a system for intermingling two separate fuel to air mixture charges formed from different fuels of low and high octane rating respectively for use in an internal combustion engine, a reservoir for a low octane fuel, a closed reservoir container for a high octane fuel comprising a liquid petroleum gas, separate mixing tubes and jets for the respective fuels and for each a fuel feed connection including means to feed the same, comprising in the case of the liquid petroleum gas a pressure reducing valve between the reservoir and the jets, separate air tubes for effecting the proportion of air and fuel in the proximity of the respective jets for intermingling the air and fuels to form charges for utilization in the engine, throttle valves for controlling the degree of opening for admitting the charges to the engine, and a passageway for intermingling the charges and combining the same at a point beyond the said throttle valves and between the engine and the said throttle valves, a manually controlled throttle connection for operating both of said throttle valves, a separately operable proportioning device coacting with the throttle connection for effecting the utilization of a lesser proportion of the high octane fuel than the low octane fuel, the said means to feed the fuel to the high octane jet having an element for maintaining a slight superatmospheric pressure of fuel on the said jet and a shutoff valve adapted to be opened by the manually controlled throttle connection whereby high octane fuel will flow upon movement of the throttle to facilitate the starting of the engine, whereby the said closed container will feed liquid petroleum gas by its own vapor pressure, and means controlled by the operation of the engine to close the said shutoff valve after the engine is started.

16. In a carburetor structure for attachment to an internal combustion engine intake manifold comprising in combination, a main carburetor body having an attachment flange and a mixing tube within the body having an opening to the atmosphere at the opposite end of the body from the flange, a fuel jet for controlling fuel flow within the mixing tube, including apparatus for supplying fuel to the jet and a throttle valve controlling the air and fuel charge, an auxiliary carburetor having a body portion adjacent to the main carburetor body having a lateral extension and an annular flange having a bore therewithin provided with mating surfaces for the said main carburetor flange whereby the main and auxiliary carburetors are adapted to be assembled together on the mating face of a similar flange on the said manifold, the said lateral extension having a bore therein which communicates with a mixing tube within the auxiliary carburetor body and said bore, a jet including apparatus for providing for the induction of a different fuel to the jet within the mixing tube having an air passage anterior thereto and a throttle valve for controlling the charge from the auxiliary carburetor located between the jet and the said bore, said throttle valves having a mechanical connection and a separately operated lost motion device between the same, and control means therefor whereby the auxiliary throttle is controlled by either the mechanical connection or the separately operated connection in the operation of the lost motion device.

17. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising separate means to control separate charges of air and fuel formed from separate fuels having relatively low and high octane ratings respectively including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges, and a mechanical positive acting proportioning device connecting the valves, whereby a definite ratio of the high octane charge to the low octane charge can be determined through the throttle range of movement of at least one of the said valves, and an end position stop for the low octane valve at the closed position of the high octane valve and included in the connection between the valves, whereby the idle open setting of the low octane valve can be determined at the fully closed position of the high octane valve, the said proportioning device having an additional stop thereon and a manually moved device for cooperating with the stop for limiting the range of movement of the low octane throttle valve.

18. In a carbureting apparatus for use with an internal combustion engine having an intake manifold comprising manually operated separate means to control separate charges of air and fuel, including means to combine the said charges for utilization in the engine, an additional control element therefor, said control means including throttle valves for the separate charges, at least one of which is adapted to have a complete range of movement in the operation thereof, with the other of said valves having also a pressure responsive element connected therewith and subject to the difference between the pressure in the manifold and the atmopshere to provide a controlled movement of the valve according to an operative condition of the engine as determined by said difference of pressure, said additional control element comprising a connection for selectively limiting the movement of the other of said valves towards its closed position by a member coacting therewith to maintain the selective position.

19. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising manually operated separate means, comprising two carburetors including a main and an auxiliary carburetor, to control separate charges of air and fuel formed from separate fuels including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges, and a mechanical positive acting proportioning device connecting the valves, and an adjustable end position stop for one of the valves in the main carburetor included in the connection between the valves, setting the idle open position of the last mentioned valve into a limited movable position by the fully closed position of the other of said valves in the auxiliary carburetor.

20. In a carbureting apparatus for use with an internal combustion engine having an intake manifold, comprising manually operated separate means, comprising two carburetors including a main and an auxiliary carburetor, to control separate charges of air and fuel formed from separate fuels including means to combine the charges in the intake manifold for utilization in the engine, said control means comprising separate throttle valves for the separate charges and a fuel shutoff valve adapted to substantially shut off simultaneously with the closed position of one throttle valve and a mechanical positive acting proportioning device connecting the throttle valves, whereby a definite ratio of the charges

can be determined through the throttle range of movement of at least one of the said valves, and an adjustable end position stop for one of the throttle valves in the main carburetor at the closed position of the other throttle valve in the auxiliary carburetor, comprising an independently adjustable element, included in the connection between the throttle valves, setting the idle open position of the first mentioned throttle valve into a limited movable position by the fully closed position of the other throttle and shutoff valve.

21. In a carbureting apparatus, a main carburetor, an auxiliary carburetor, manually operated means to control each of a plurality of separate charges of air and fuel, including means to combine the said charges for utilization in an engine, having an intake manifold, said control means including throttle valves for the separate charges, at least one of which is adapted to have a complete range of movement in the operation thereof, and the other of said valves having also a pressure responsive element connected therewith and subject to a difference between the pressure in the manifold and the atmosphere to provide a controlled movement of the valve according to an operative condition of the engine as determined by said difference of pressure, and an additional control element comprising a device for locking the other of said valves into closed position.

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