M. BUCKER.

CARBURETER.

APPLICATION FILED FEB. 10, 1913.

1,168,783.

Patented Jan. 18, 1916.

3 SHEETS—SHEET 1.

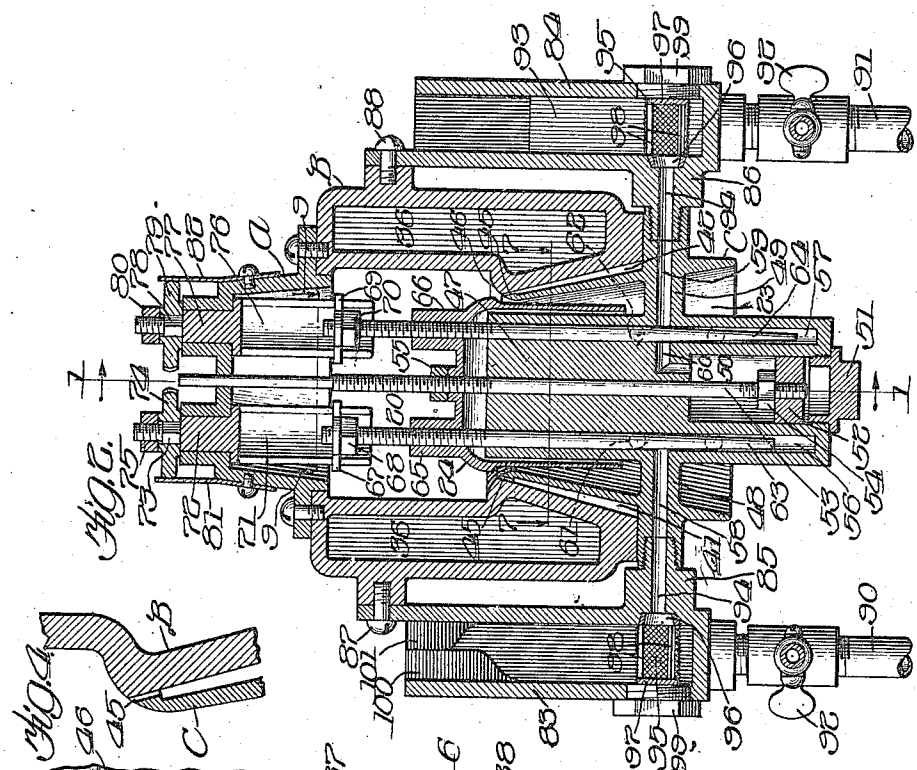


Fig. 4.

Fig. 3.

Fig. 1.

Fig. 5.

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Inventor:
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By W. Ferguson Atty

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3 SHEETS—SHEET 2.

Fig. 6.

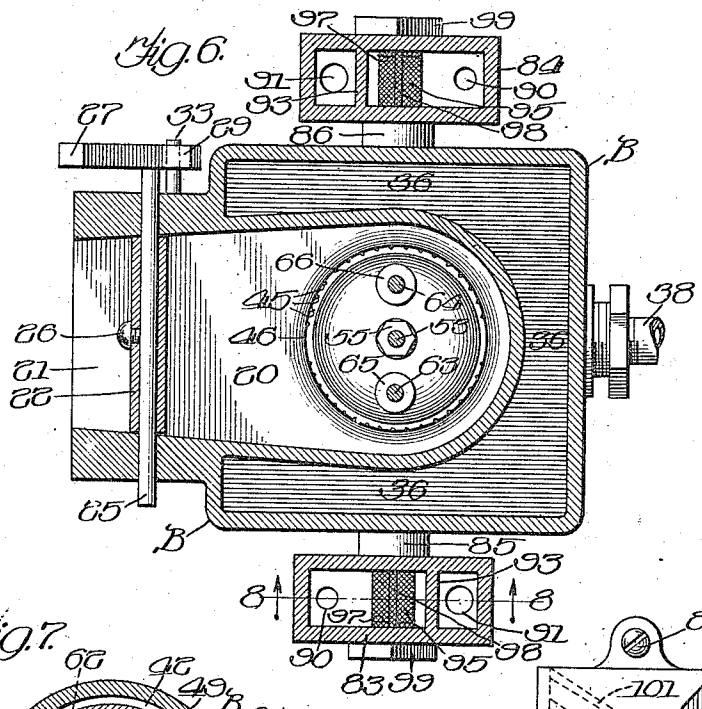


Fig. 7.

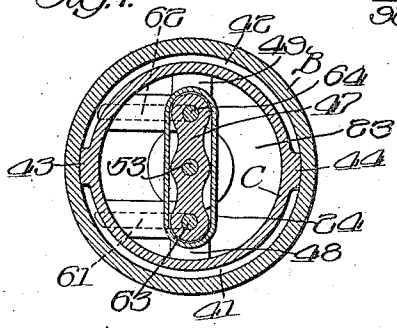


Fig. 8.

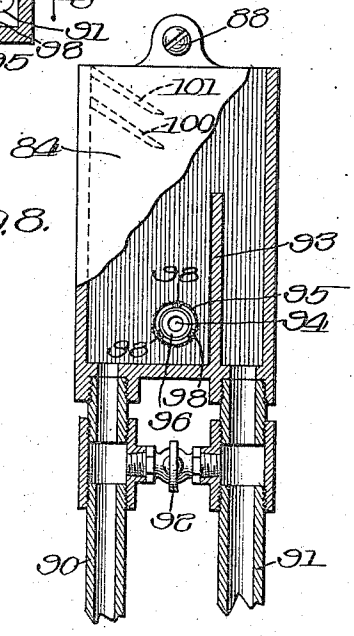
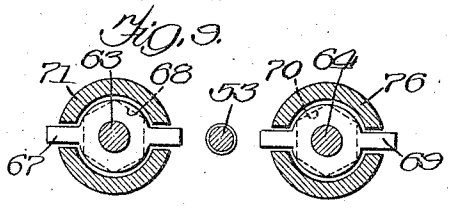


Fig. 9.



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3 SHEETS—SHEET 3.

Fig. 10.

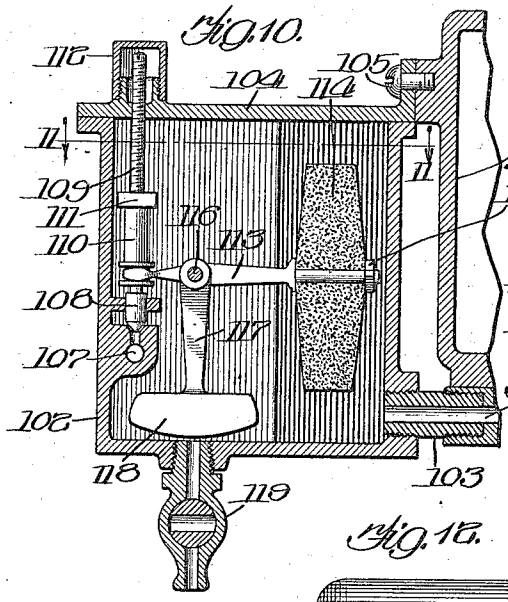


Fig. 11.

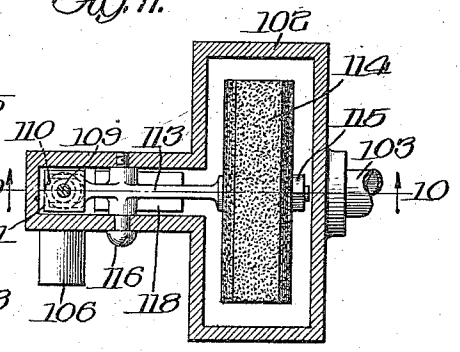


Fig. 12.

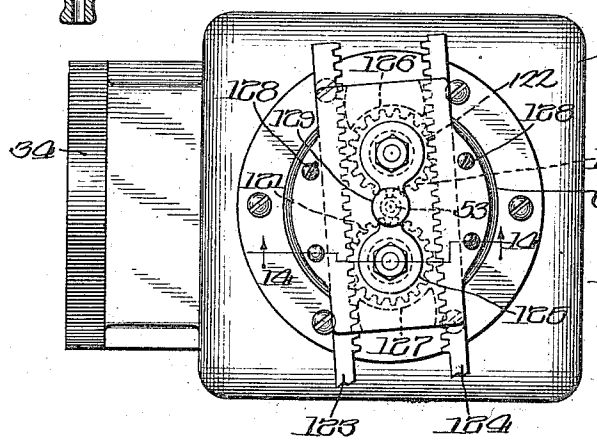


Fig. 13.

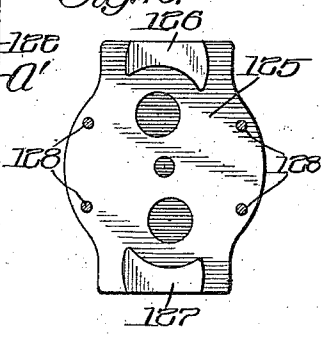
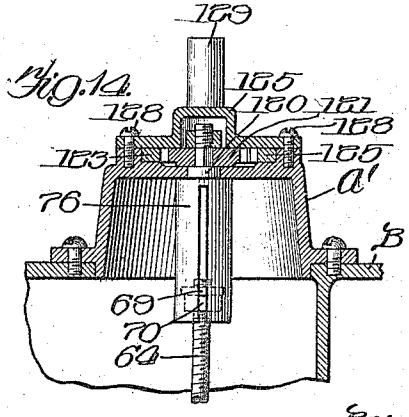


Fig. 14.



Witnesses:

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UNITED STATES PATENT OFFICE.

MERLE BUCKER, OF CHICAGO, ILLINOIS.

CARBURETER.

1,168,783. Specification of Letters Patent. Patented Jan. 18, 1916.

Application filed February 10, 1913. Serial No. 747,456.

To all whom it may concern:

Be it known that I, MERLE BUCKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

The present invention relates to carbureters for use in vaporizing liquid fuels for operating internal combustion engines, and the objects of the invention are, (1) to provide a carbureter which may be operated either with a single fuel, such as gasolene, or with a composite fuel, such as would be produced by atomizing and mingling water and kerosene; (2) to provide a device of this character which will mix the fuel, whether single or composite, with air, to form as perfect a gas as possible; (3) to provide an improved control for the fuel and air by which the most effective explosive mixture will be maintained for all engine speeds, whether resulting from throttle control, or from variations of load; (4) to provide an improved construction of fuel inlets to the mixing chamber; (5) to provide improved mechanism for mechanically operating the control valves; and (6) to provide improved fuel chambers for the control of the fuel in its passage to the carbureter proper, and other features and details of construction which combine with the above to produce a device which shall be simple in construction, efficient and economical of fuel in operation, and operatively unaffected by the ordinary wear of parts, or by the presence of dust or dirt drawn into the device by the suction of the engine.

The several objects and features of my invention will be more fully understood upon reference to the following detailed description taken in connection with the accompanying drawing, and the scope of the invention will be particularly pointed out in the appended claims.

In the drawing Figure 1 is a longitudinal vertical section of a carbureter constructed in accordance with my invention, the plane of section being indicated by the line 1—1 of Fig. 2; Fig. 2 is a transverse vertical section of the same, the plane of section being indicated by the line 2—2 of Fig. 1; Fig. 3 is a view illustrating in elevation and upon an enlarged scale the fuel inlets to the mixing chamber; Fig. 4 is a vertical section of the same; Fig. 5 is an elevation of the throttle-valve arm and its associated stop; Fig. 6 is a horizontal section of the carbureter taken on a plane indicated by the line 6—6 of Fig. 1; Fig. 7 is a similar section of the central portion of the carbureter taken on a plane indicated by the line 7—7 of Figs. 1 and 2; Fig. 8 is a partial vertical section of one of the fuel chambers or cups through which fuel is supplied to the passages in the main portion of the carbureter, the plane of section being indicated by the line 8—8 of Fig. 6; Fig. 9 is a transverse section of the adjusting mechanism of the fuel control valves, the plane of section being indicated by the line 9—9 of Fig. 2; Fig. 10 is a vertical section of a fuel chamber employing a float control valve which may replace the fuel chamber of Fig. 8 where the carbureter is to be used on motor vehicles, the plane of section being indicated by the line 10—10 of Fig. 11; Fig. 11 is a horizontal section of this float chamber, the plane of section being indicated by the line 11—11 of Fig. 10; Fig. 12 is a plan view of a valve-operating mechanism which may be employed in lieu of that illustrated in the preceding figures, wherever it is desired to control the valves from a distance; Fig. 13 is a view of a guide-plate of this latter mechanism, inverted; and Fig. 14 is a transverse section of this operating mechanism and associated parts taken on a plane indicated by the line 14—14 of Fig. 12. Throughout these figures, like characters refer to like parts.

In the particular embodiment of the invention illustrated, the body of the carbureter is composed of an upper casting A, a central casting B, and a lower casting C. The central casting is provided with a chamber, or passage, 20, whose outlet 21 is controlled by a throttle-valve 22 and whose inlet 23 is controlled by an air-valve 24. In operation the suction of the engine draws air through inlet 23, chamber 20 and outlet 21. The throttle-valve is operated by hand in the usual way, while the air-valve 24 is operated by the suction of the engine. The throttle-valve is mounted on a transverse pintle 25 which is journaled in its opposite ends in opposite walls of the outlet 21 of the chamber 20. A set-screw 26 secures the throttle-valve in proper position. One end of the pintle 25 extends beyond the wall of the casting and has an arm 27 rigidly secured to it. This arm is provided with openings 28 for the reception of operating

connections. It also carries stop-arms 29 and 30. The latter is provided with an adjusting screw 31 which may be set in any desired position and held therein by a set-screw 32. The stop-arm 29 and the screw 31 in the arm 30 coöperate with a stop-pin 33 which extends outward from the side of the casting B. The limits of movement of the throttle-valve are determined by the engagement of arm 29 and pin 33, in the one case, and by the engagement of screw 31 and pin 33, in the other. The outlet end of the casting B is provided with a flange 34 having suitable openings 35 for suitably connecting the carbureter to the engine.

The casting B is cored out so as to provide a jacket 36 to which any fluid may be supplied. Pipes 37 and 38 communicate with the jacket 36 and provide for the admission of the fluid to the jacket and its discharge therefrom. Ordinarily, hot water would be used for supplying the necessary heat to the carbureter by means of this jacket, a constant circulation being kept up by supplying the fluid through one pipe and taking it off through the other.

The lower casting C, as before noted, is provided with the air inlet 23. It is also provided with an annular flange 39 which abuts against a coöperating face upon the casting B so as to provide a close fit, and screws 40, passing through the flange 39 into threaded openings in the casting B, hold the two firmly together. When thus assembled, there is an annular space between a portion of the outer wall of the casting C and a portion of the inner wall of the casting B, which extends around the air inlet 23. This space is divided into two portions 41 and 42 by partitions 43 and 44 extending from the casting C outward into engagement with the casting B. These two spaces 41 and 42 are in communication with the mixing chamber 20 through a series of small openings 45 which constitute the fuel inlets to said chamber.

As illustrated more particularly in Figs. 3 and 4, the castings C and B are formed with close fitting abutting faces along the line 46 at the upper end of the spaces 41 and 42. The fuel inlets 45 are then provided by filing out grooves in one or both of these abutting faces. By means of this construction, it is possible to accurately determine the size of these openings 45 and to provide any desired number, such as experiments with a particular type of engine may seem to justify. These fuel spaces 41 and 42 and their different sets of outlets 45 constitute means for supplying different fuel ingredients to the mixing chamber 20 in case it is desired to use a composite fuel. If this is not desired, then of course both spaces 41 and 42 would be supplied with the same fuel.

The central portion of the casting C consists of a web-like portion 47 joined to the outer portion by ribs 48—49. The lower end of the portion 47 of the casting C is bored out so as to form a dash-pot 50 which is closed by a threaded cap 51. A piston 52 is located in the dash-pot and is secured upon the lower end of the rod 53 by a nut 54. This rod extends through a central bore in the portion 47 of the casting C and is in threaded engagement with the central portion of the air-valve 24, the valve being locked in place by a lock-nut 55. Beyond the threaded portion of the rod 53, it is reduced in diameter and extends through an opening in the top of the casting A, as clearly illustrated. It will be seen that as the air valve 24 is operated in response to the suction of the engine, the piston 52, in the dash-pot 50, will retard its to-and-fro movement. It will also be seen that the position of the valve may be determined by manually grasping the upper end of the rod 53 and moving it up or down. The central portion 47 of the casting C is also provided with vertical bores 56 and 57 which extend almost its whole length, but which are closed at their lower ends. The bore 56 is in direct communication with the passage 58 extending through the rib 48. The bore 57 is in direct communication with the passage 59 extending through the rib 49. The latter bore is also in direct communication with the dash-pot 50 through the angular passage 60. The bore 56 is also in direct communication with the fuel space 41 through passage 61, while bore 57 is in direct communication with the fuel space 42 through passage 62. From this description, it will be seen that fuel admitted to passage 59 from a suitable source would be free to pass down through a portion of bore 57 and up through passage 62 to the fuel space 42 and thence out through the associated fuel inlets 45 into the mixing chamber 20. Fuel thus supplied would also pass into the dash-pot 50 and coöperate with the piston therein in the control of the air-valve 24. On the other hand, fuel admitted from a suitable source to the passage 58 would be free to pass down through a portion of bore 56 and up through passage 61 to the annular fuel space 41 and thence out through fuel inlets 45 to the mixing chamber 20. In order to control the flow of fuel through these passages, the bores 56 and 57 are provided with taper-valves 63 and 64, respectively, whose tapered portions for all positions of the valves begin above the passages 58 and 59, and extend below the inlets of passages 61 and 62, respectively. Taper-valve 63 is threaded at its upper end through a boss 65 on the air-valve 24, while valve 64 is similarly threaded through a boss 66. Valve 63 is provided with a plate 67 screwed upon its upper end and held in position by a lock-nut

68. Valve 64 is similarly provided with a plate 69 and lock-nut 70. The plate 67 has laterally projecting lugs, or pins, which engage vertical slots in the tubular member 71, which is provided with a reduced portion 72, which is journaled in the upper portion of the casting A. This tubular member is still further reduced at its upper end and squared at 73 for the reception of a thumb-head 74, which is held in place by nut 75 screwed upon the extreme upper end of the member which is threaded for this purpose. Similarly, plate 69 engages slots in the member 76, which has a journaled reduced portion 77 and squared portion 78 having thumb-head 79 held in place by a nut 80. A spring-clip 81 secured at its lower end to the casting A engages notches in the side of thumb-head 74 to hold it in its adjusted positions. A similar clip 82 coöperates in the same way with the thumb-head 79. From this description, it will be seen that the rotation of either of the heads 74 or 79 will rotate the members 71 or 76 with a corresponding rotation and longitudinal movement of the valves 63 or 64, as the case may be. By this means, either or both valves may be adjusted to vary the flow of fuel through the passages of the carbureter to the mixing chamber.

The air-valve 24 has a depending portion which more or less closely embraces the central portion 47 of the casting C and at its periphery it comes into proximity to the fuel inlets 45. In consequence of this, all the air which passes into the chamber 20 is drawn over the fuel inlets and the fuel is taken up and carried into the mixing chamber and thoroughly commingled with the air on its way to the engine. Where the fuel employed is a composite of two fuel ingredients, such as water and kerosene, these ingredients are also thoroughly commingled with each other and with the air. By removing the casting A and turning the central rod 53, and associated nut 55, the position of the air-valve relative to it and therefore relative to the fuel inlets 45, may be varied as judgment may require. Thus, it is possible to regulate both the amount of fuel which may pass by the tape-valves and also to vary the position of the air-valve relative to the fuel inlets.

The fuel may be supplied to the passages 58 and 59 in any suitable way. As illustrated in Figs. 1 and 8, the fuel is supplied through fuel cups or chambers 83 and 84, which are provided with threaded bosses 85 and 86, which are screwed into the threaded openings in the ends of the ribs 48 and 49, respectively. The upper ends of the cups 83 and 84 are secured in place by screws 87 and 88 which pass through lugs upon the cups into threaded engagement with bosses on the casting B. Each cup is supplied with a supply-pipe 90 and an over-flow pipe 91. A pipe passing between the two is controlled by a valve 92. A dam or partition 93 rises from the bottom of the cup to the height at which it is desired to maintain the level of the fuel. As illustrated, this height is slightly below that of the fuel inlets 45, but the suction is sufficient to draw up the fuel through these inlets. A passage 94 extends through the bosses 85, in the one case, and 86 in the other, to place that portion of the cup which is on the inlet side of the partition 93 in communication with the supply passages 58 and 59 of the carbureter. A strainer 95 strains the fuel as it leaves the oil cups. This strainer consists of an inner beveled ring 96 joined to an outer ring 97 by a plurality of arms 98. The ring 96 fits into the enlarged end of the passage 94 and is held in place by a cap 99 which is threaded into an opening in the opposite wall of the cup and presses against the ring 97 to hold the strainer in position. Baffle-plates 100 and 101 extend from opposite walls of the cup at a point near the top of the cup directly above and in line with the supply-pipe 90. In practice, with this form of oil chamber, the fuel is forced by a pump through supply-pipe 90 at a sufficient rate to raise it to the height of the partition 93, the surplus passing over the partition and out through the return pipe 91 to the supply associated with the pump. In case the fuel tends to spurt into the cup from the pipe 90, it will strike against the baffle-plates 100 and 101 and thus be kept within the cup. It will be obvious that if the engine is to be started by one grade of fuel and to be subsequently run by another, that then the oil cup would be manually supplied with the former until it was filled up to the height of the partition 93. This fuel would then flow through the passage 94 and on into the mixing chamber of the carbureter where it would mix with the incoming air and be carried on to the engine to do its work. As the engine thus began to operate, it would drive the pump and the second grade of fuel would begin to be supplied. This would occur without any special attention on the part of the operator. It would only be necessary, in starting, to close the by-pass valve 92 so that the fuel would be supplied to the cup 84 and not returned through pipe 81 without passing into the cup. The presence of this by-pass is of importance, for when it is desired to stop the engine, it is only necessary to open the by-pass valve 92, then the fuel will pass through return pipe 91 without going into cup 84. As a result, the level of the fuel in the cup will gradually lower until no fuel is supplied to the carbureter and the engine as a result will be free to fully exhaust all the fuel from the passages before it stops. This will greatly tend to keep the entire mechanism clean and will also leave it free to be

primed with the first grade of fuel in case a lower grade is used, as it clearly may be.

It will be apparent that if it is desired to use the carbureter with a single fuel, such as gasolene, then both cups 83 and 84 will be supplied with the fuel and it will be supplied in turn to each of the fuel inlets 45 and be taken up by the incoming air and thoroughly mixed with it and carried on to the engine cylinder. On the other hand, if a composite fuel is to be used, such as water and kerosene, then one fuel cup will be supplied with water and the other with kerosene. Water will then be supplied to the fuel inlets 45 associated with its fuel cup, and kerosene will be supplied to the remaining fuel inlets. The incoming air will take up both of these ingredients and thoroughly mix them together and with the air, and they will thus be carried on into the engine cylinder.

As previously indicated, if it is desired to use the carbureter with an automobile, or other motor vehicle, employing an internal combustion engine, then the fuel cups 84 and 85 are preferably replaced by a fuel chamber 102, which is connected by a short section of pipe 103 so as to provide a connection with the proper supply passage, as 58 of the carbureter. The cover 104 of the fuel chamber is preferably secured to the casting B by a screw 105. A supply-pipe 106 supplies fuel to the valve opening 107, and a valve 108 controls the admission of the fuel from said passage to the chamber 102. This valve is provided with a threaded stem 109 which extends through a sleeve 110, which is provided with a squared head 111 of such a width as to engage the walls of the chamber 102 to prevent its rotation. The stem 109 extends through a suitable opening in the cover 104 and may be rotated to shift the sleeve 110 to any desired position. A cap 112 screwed on to a threaded boss on the cover 104 covers the end of the stem 109. A float-arm 113 is bifurcated at one end for engagement with the sleeve 110 and carries the float 113, of cork, or similar material, at its opposite end. A nut 115 holds the latter in position. The arm 113 is supported by a pivot 116 in the form of a screw extending through the adjacent walls of the chamber. An arm 117 carries a weight 118 at its lower end and is secured to the arm 113 at its upper end so as to move with it. A drain-cock 119 is located at the bottom of the chamber and is arranged to drain off the fuel. When the parts are in normal position, fuel is supplied to a height about on a level with the pivot 116. As the fuel is being admitted, the valve 108 is kept open. When the fuel reaches this level, the float is raised sufficiently to force the valve 108 against its seat and cut off the further supply for the time being. When the fuel level lowers, the float-arm drops down and valve 108 is opened and more fuel is admitted. This action is repeated continuously as the fuel is being consumed and this action will remain the same whether but a single or a composite fuel is employed.

It may also be desirable where the carbureter is to be used upon automobiles, or the like, to be able to adjust the taper-valves 63 and 64 from time to time as changes in conditions may require without the operator leaving his position in the car. Accordingly, I have provided the mechanism illustrated in Figs. 12 to 14, inclusive. In this mechanism, the casting A′ differs slightly in shape from the casting A, while the portion of the slotted tube members which bear therein is somewhat shorter, as illustrated at 120. Otherwise these tubular members are the same. In this mechanism, however, the thumb-heads 74 and 79 are replaced by gear-wheels 121 and 122, which mesh respectively with racks 123 and 124. A guide-plate 125 is fitted upon the casting A′ so as to leave a guiding space for the racks 123 and 124. Projections 126 and 127 on the under side of the plate 125 keep the racks from being drawn toward each other. Screws 128 hold the plate 125 in place. A tubular extension 129 from the center of the plate 125 allows space for the free passage of the center rod 53. With this mechanism, it will be seen that the shifting of the racks 123 and 124 back and forth will rotate the associated tubular members and communicate a longitudinal movement to the taper-valve 63 and 64 to bring about the desired fuel regulation. I have not shown any means for connecting the racks 123 and 124 to any mechanism within the reach of the operator when in the seat, but it will be apparent that any suitable means may be employed for this purpose.

In carrying out my invention, it will be apparent that many alterations and modifications may be made in the details of construction and arrangement which differ from those herein disclosed without departing from the spirit and scope of my invention. I, therefore, do not wish to be limited to the specific matter herein disclosed but aim to cover all such alterations and modifications by the terms of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A carbureter comprising a passage open to atmosphere at one point and at another point adapted to communicate with an engine to be supplied, a valve intermediate of said points for opening and closing said passage, a plurality of long, wide and shallow fuel spaces located along said passage, a jacket for applying a fuel heating medium to the side of said spaces throughout practically their entire length and

breadth, fuel inlets in the passage walls leading from said spaces into said passage at points adjacent to the closing edges of said valve when in its closed position, and passages for supplying different fuel ingredients to the different fuel spaces, whereby the air drawn through said passage by the suction of the engine is caused by said valve to sweep over said inlets at an increased velocity and take up fuel ingredients therefrom and thoroughly mix them in said passage.

2. A carbureter comprising a passage open to atmosphere at one point and at another point adapted to communicate with an engine to be supplied, a plurality of long, wide and shallow fuel spaces located along said passage, a jacket for applying a fuel heating medium to the side of said spaces throughout practically their entire length and breadth, fuel inlets in the passage walls leading from said spaces into said passage at points intermediate of the first mentioned points, fuel passages for supplying different fuel ingredients to the different fuel spaces, a valve in said first mentioned passage having its closing edges movable in close proximity to said inlets to cause the air drawn through said passage to pass over said inlets at increased velocity to take up the fuel ingredients therefrom and thoroughly mix them in said passage, fuel control valves in said fuel passages movable as a unit with said first mentioned valve, and means for adjusting each of said fuel control valves relative to said first mentioned valve to vary the amount of the fuel ingredients admitted to said passage.

3. A carbureter comprising a passage open to atmosphere and adapted to communicate with an engine to be supplied, a plurality of long, wide and shallow fuel spaces located along said passage, a jacket for applying a fuel heating medium to the side of said spaces throughout practically their entire length and breadth, fuel inlets leading from said spaces into said passage, passages for supplying different fuel ingredients to the different fuel spaces, a valve in said passage having its edges movable toward and from said fuel inlets to vary the velocity of the air passing over them, and fuel control valves carried by said first mentioned valve and adjustable relative thereto and operating in said fuel passages to vary the amount of the fuel ingredients supplied to said fuel inlets.

4. A carbureter comprising a chamber adapted to communicate with an engine to be supplied, an air inlet to said chamber, fuel inlets to said chamber, passages for supplying different fuel ingredients to different fuel inlets, and three directly connected valves, one for varying the supply of air through said air inlet and the two remaining for varying the supply of the fuel ingredients through said passages and fuel inlets.

5. A carbureter comprising a chamber adapted to communicate with an engine to be supplied, a substantially horizontal fuel supply passage, a substantially vertical passage extending downward from said supply passage, an additional passage leading from said vertical passage at a point below the entrance of said supply passage, a series of relatively small fuel inlets to said chamber in communication with said additional passage, and a taper-valve in said vertical passage having its tapered portion normally extending from a point above said supply passage to a point below said additional passage.

6. A carbureter comprising a chamber adapted to communicate with an engine to be supplied, an annular fuel space, a series of relatively small fuel inlets to said chamber from said space, a supply passage, a vertical passage having an upper inlet from said supply passage and a lower outlet to said space, and a taper-valve in said vertical passage.

7. A carbureter comprising a chamber adapted to communicate with an engine to be supplied, an annular fuel space, a series of relatively small fuel inlets to said chamber from said space, a supply passage, a vertical passage having an upper inlet from said supply passage and a lower outlet to said space, a taper-valve in said vertical passage, an air inlet to said chamber, and means for causing the incoming air to pass over said fuel inlets to take up fuel.

8. A carbureter comprising a chamber adapted to communicate with an engine to be supplied, a substantially horizontal fuel supply passage, a substantially vertical passage extending downward from said supply passage, an additional passage leading from said vertical passage at a point below the entrance of said supply passage, a series of relatively small fuel inlets to said chamber in communication with said additional passage, a taper-valve in said vertical passage having its tapered portion normally extending from a point above said supply passage to a point below said additional passage, an air inlet to said chamber, and means for causing the incoming air to pass over said fuel inlets to take up fuel.

9. A carbureter comprising a passage adapted to lead from atmosphere to an engine to be supplied, a narrow annular space extending practically entirely around said passage, a row of short fuel inlets connecting said space to said passage, partitions for dividing said space into spaces for different fuel ingredients, means for supplying the fuel ingredients to said spaces, means for maintaining said spaces practically full

of their respective fuels at all times, and a valve in said passage having an edge movable toward and from said fuel inlets to increase the velocity of air as it passes said inlets to draw the fuel ingredients from said inlets and spaces and mix the same in said passages.

10. A carbureter comprising a body having a passage adapted to lead from atmosphere to an engine to be supplied, fuel inlets to said passage, a vertically movable valve for controlling the flow of air over said inlets to draw off fuel to mix it and air in said passage, said valve being free from sliding engagement with the walls of said passage, a longitudinally movable fuel control valve adjustably mounted on said vertically movable valve, an adjusting member journaled in said body, and means for causing the rotation of said member to longitudinally move said control valve.

11. A carbureter comprising a body having a passage adapted to lead from atmosphere to an engine to be supplied, fuel inlets to said passage, a vertically movable valve for controlling the flow of air over said inlets to draw off fuel and mix it and air in said passage, means for guiding said valve independently of the walls of said passage, a longitudinally movable fuel control valve adjustably mounted upon said vertically movable valve, an adjusting member journaled in said body, and a pin and slot connection between said control valve and adjusting member whereby the rotation of the latter longitudinally moves the former.

12. A carbureter comprising a passage open to atmosphere at one point and at another point adapted to communicate with an engine to be supplied, a valve intermediate of said points for opening and closing said passage, a plurality of fuel spaces located along said passage and adapted to contain different fuel ingredients, and fuel inlets in the passage walls leading from said fuel spaces into said passage at points adjacent to the closing edges of said valve when in its closed position, whereby the air drawn through said passage by the suction of the engine is caused by said valve to sweep over said inlets at an increased velocity and to take up fuel ingredients therefrom and thoroughly mix them in said passage.

In witness whereof, I hereunto subscribe my name this 31st day of December, A. D., 1912.

MERLE BUCKER.

Witnesses:
T. H. FERGUSON,
IDA E. LARSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."