F. W. HAGAR.

CARBURETER.

APPLICATION FILED OCT. 1, 1908.

952,326.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

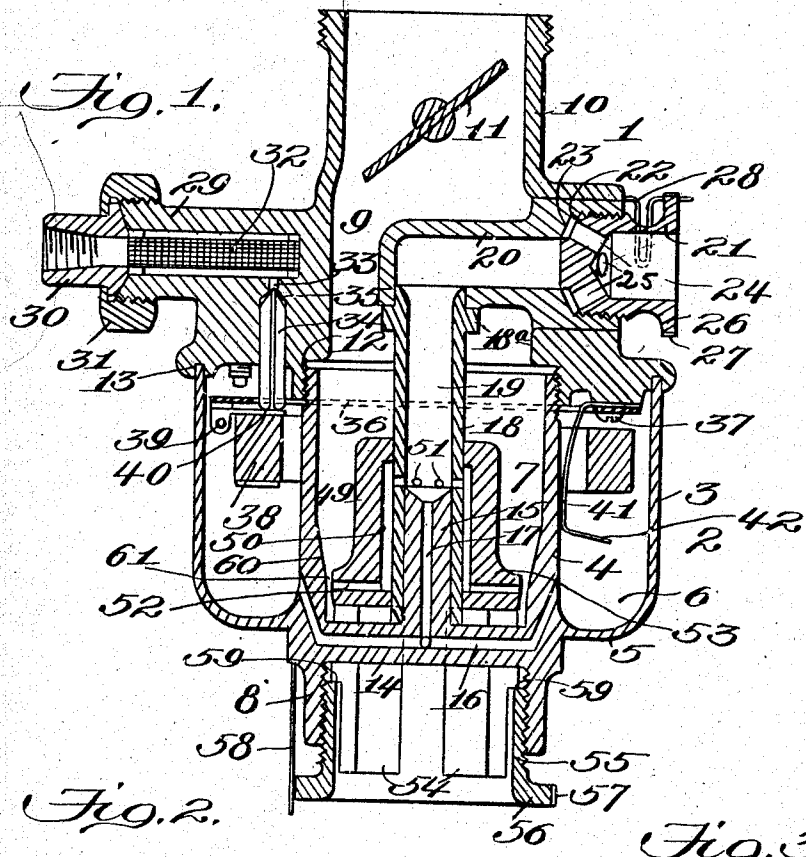


Fig. 2.

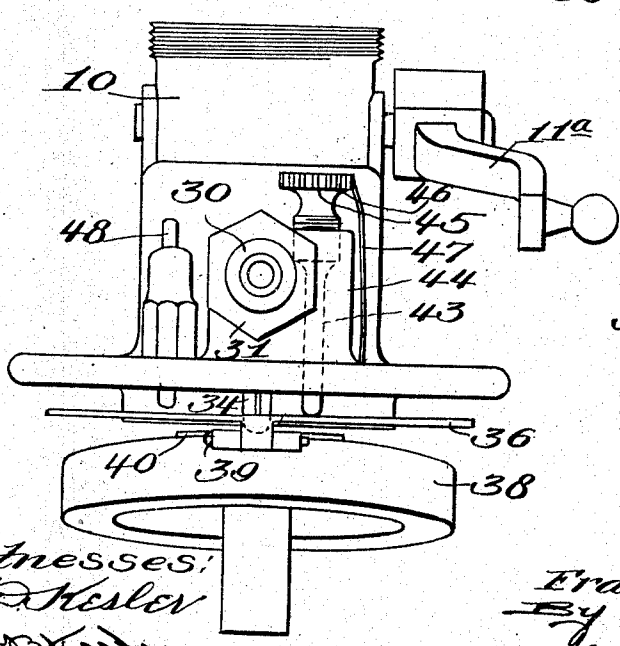
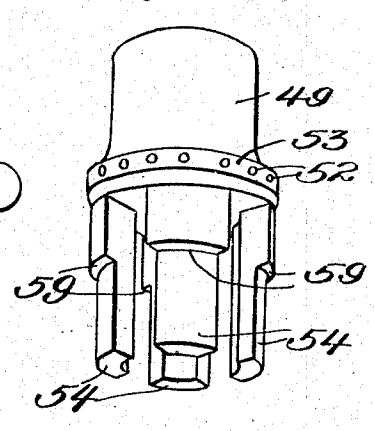


Fig. 3.



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2 SHEETS—SHEET 2.

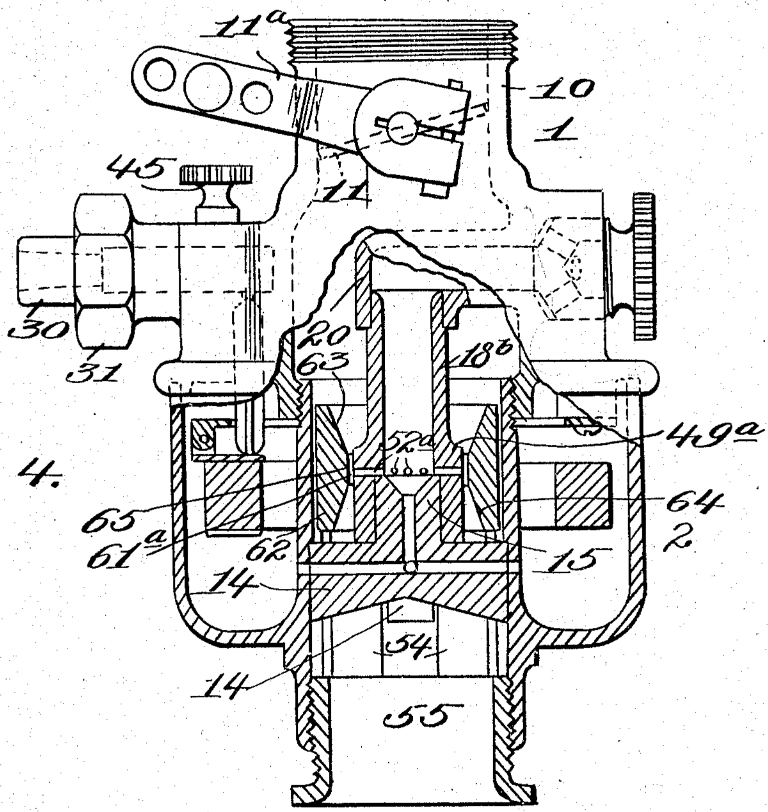


Fig. 4.

Fig. 6.

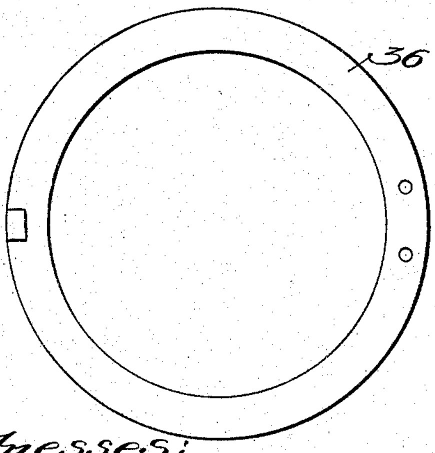
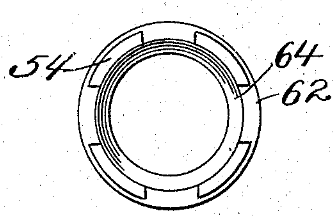


Fig. 5.



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CARBURETER.

952,326. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed October 1, 1908. Serial No. 455,712.

To all whom it may concern:

Be it known that I, FRANKLIN W. HAGAR, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to new and useful improvements in carbureters for explosive engines and more particularly to an improvement in that type of construction in which the amount of air admitted to the mixing chamber of the carbureter and fed therefrom to the engine cylinder is automatically proportioned in relation to the suction created in the mixing chamber and in which the hydrocarbon is fed to the mixing chamber by means of the suction created in the latter, and the quantity fed is automatically proportioned in accordance with the degree of suction created.

The structure contemplated is similar to the construction disclosed in my Patent, No. 802,038, in the features of the centrally located suction chamber, the mixing chamber surrounding the suction chamber, and the valve means for regulating the degree of vacuum in said suction chamber in proportion to a determined degree of suction in the mixing chamber.

The invention has as a primary object the provision of specifically novel automatically operating means for correctly proportioning the relative amounts of air and hydrocarbon in the gaseous fuel mixture in accordance with variations in the degree of suction in the mixing chamber, under different conditions of working. Such means may be stated, more particularly as of that type wherein a movable strangler element is associated with a companion part and by movement to different positions varies the efficient size of the air passage or throat-way around the sprayer nozzle. This strangler element is movable and is acted upon by the suction influence in the mixing chamber. When the carbureter is working at about one-third or over of its full capacity, the strangler element, under the aforesaid suction influence assumes a position whereby the aforesaid throat-way is opened to its maximum extent, but when the charge is less than one third the capacity of the carbureter, the strangler element assumes corresponding positions to proportionately reduce the size of said throat-way. By this means, the amount of air passing through the throat-way is varied in proportion to the amount of liquid fuel, which amount of fuel will be greater or less as the suction in the mixing chamber increases or decreases under different conditions of working. In the preferred embodiment of the invention the strangler element is freely movable, that is to say its movement in one direction is under the suction influence and its movement in the opposite direction is by gravity. While this arrangement is preferred, it is not essential to certain of the combinations of elements which the invention presents and in such cases may be varied when the circumstances warrant, without departing from the spirit of the invention or the basic principles involved.

As an adjunct of the strangler element, the invention includes means for effecting an initial adjustment of said element to any desired position, in order that the required adjustment of the charge may be made at starting. This adjusting means may be more specifically stated as a follower which in certain positions serves as a support for the strangler element. The provision of the means for adjustably positioning the strangler element, in the relations to be set forth, is reckoned as a further and collateral novel feature of the invention.

The foregoing and other novel features of construction and organization will be set forth at length in the following description, which is to be read in connection with the accompanying drawings, wherein are illustrated preferred and advantageous embodiments of the invention. The novel features set forth are identified in the claims appended at the end of the description, which claims define the novel scope of the invention.

In the said drawings:—Figure 1 is a central vertical section of a preferred embodiment of carbureter made in accordance with the present invention. Fig. 2 is an elevation thereof, looking from the left of Fig. 1. Fig. 3 is a detailed perspective view of the movable strangler element employed in connection with the form disclosed in Fig. 1. Fig. 4 is a view, partly in side elevation and partly in central vertical section illustrating a slightly modified embodiment of the invention, the modification residing in the construction of the strangler element. Fig. 5 is an end elevation of the strangler element

disclosed in Fig. 4, and Fig. 6 is a bottom plan view of the spring support for the annular float contained in the hydrocarbon reservoir.

The present carbureter, in its assembled relation comprises an upper section 1 and a lower section 2. The latter comprises essentially an outer cylindrical shell 3 and an inner shell 4, spaced from and concentric to the shell 3 and connected integrally therewith by an annular bottom wall 5, the shells 3 and 4 and the wall 5 together constituting the hydrocarbon reservoir 6. The shell 4 also serves as the cylindrical wall of the mixing chamber and main air passage 7, and is alined with an annular flange 8 depending from the wall 5 and formed with internal threads.

The section 1 has a cored out passage 9 which is alined with the mixing chamber 7 and forms in effect a continuation thereof. The upper portion of the passage 9 is defined by an annular flange 10 which is formed for connection with a pipe leading to the engine cylinder and serving as a conductor for the carbureted fuel mixture. A disk valve 11 for throttling the motor is assembled within the flange 10, the valve 11 being similar to the throttle valves ordinarily employed in the art and having its stem projected at one side of the section and provided with an operating arm 11^a.

The section 1 is detachably secured to the section 2 and incidentally serves as the closure for the reservoir 6. Accordingly the shell 4 is externally threaded at its upper end for engagement in a threaded annular flange 12 depending from the section 1 and alined with the passage 9 and the upper end of the shell 3 fits in an annular channel or groove 13 formed in the underface of the section 1.

The shell 4 is bridged at its lower end by a transverse bar 14, which carries centrally thereof an upstanding nozzle 15. An angular unobstructed duct 16 extends through the bar 14 and communicates at its ends with the reservoir 6 and centrally thereof with a duct 17 extending axially of the nozzle 15. The latter is inclosed in a vertical sleeve 18 which forms the wall of a suction chamber 19. The lower end of the sleeve 18 rests upon the bar 14 and the upper end of said sleeve is received in the mouth of an angular air pipe 20 which is set horizontally in the wall of the section 1 and which establishes communication between the exterior and the suction chamber 19. Said sleeve has at its upper end a stop flange 18^a which abuts against the angular end of the pipe 20.

Means are provided for regulating the amount of air in the chamber 19 in proportion to some determined degree of suction in the chamber 7 and such means preferably comprises a plug valve 21 which is threaded in the enlarged inlet end of the pipe 19 and which has an inclined valve seat 23 formed in the pipe 20. The valve 21 also has a cored out portion 24 extending from its outer end and communicating with the valve face 22 by angularly extending passages 25. The valve 21 is constructed at its outer end with a head 26 by means of which said valve may be readily turned for adjustment to desired positions, the head 26 being formed with notches 27 arranged at desired intervals. For the purpose of holding the valve 21 against turning accidentally, a pawl 28 is provided. This pawl is preferably constructed of spring wire and has an end fast in the section 1 and a yieldable free end for engagement in the notches 27. The valve 21 is turned outwardly to increase the supply of air and inwardly to decrease such supply. As the valve is turned outwardly the distance between the valve face 22 and the valve seat 23 is increased, consequently enlarging the space between the faces 22 and 23 and providing for the passage of a relatively greater volume of air to the chamber 19. In like manner when the valve 21 is turned inwardly the space between the faces 22 and 23 is diminished and it follows that the volume of air which passes through said space is relatively decreased.

The section 1 is provided with a tubular fuel inlet extension 29 which projects horizontally at one side thereof. A nipple 30 for connection to the supply pipe from the hydrocarbon tank is secured at the end of the extension 29 by a suitably formed nut 31. Within the extension 29 is a filter screen 32. Communication is had between the reservoir 6 and the inlet extension 29 by a connecting duct 33 within which works an axially movable valve 34 which controls the supply of liquid to the reservoir 6. The duct 33 is formed with a seat 35 for the valve 34 and above said seat is of reduced diameter in order that too free a flow of the liquid fuel may be prevented.

The valve 34 is preferably of the wing type and its movements are controlled by the float feed mechanism previously referred to. Such mechanism preferably includes an annular flat spring 36 which is secured rigidly at one side thereof to the under face of the section 1 by screws or other suitable fastenings 37. The float is designated by the numeral 38 and is of annular form, being connected by a hinge joint 39 to the spring 36 at a point diametrically opposite to the fastenings 37. The hinge joint 39 includes a wear plate 40 which is secured to the float 38 and upon which the lower end of the valve 34 rests or engages. It is preferred to provide a stop member 41 to limit the downward movement of the float, the member 41 being likewise secured by the fastenings 37 and having at its lower end an angularly

projecting portion 42 upon which the float 38 rests in its lowermost position.

Means are provided for adjusting the position of the free side of the spring 36 in order to correspondingly regulate the active height of the float *i. e.* the height at which it closes the valve 34, and such means preferably comprises a stem 43 which has a threaded engagement in a boss 44 provided on the section 1. The lower end of the stem 43 engages the spring 36 at a point near to its connection with the float 38 and the upper end of said stem is in the form of a head 45 having notches 46 at intervals therein, with which notches a spring pawl 47 associates.

The stem 43 is employed to positively depress the free side of the spring 36, which when released by said stem, of itself, springs upwardly, or rather follows the stem when the latter is turned upwardly. When the free side of the spring is depressed the amplitude of the pivotal movement of the float in closing the valve 34 is increased and when the free side of the spring moves upwardly, the amplitude of movement of the float is similarly reduced. Obviously when the float has a greater amplitude of movement inclosing the valve 34, a greater body of liquid is admitted into the reservoir 6 and for the same reason when the float has a less amplitude of movement in closing said valve, the level of the liquid in the reservoir is correspondingly reduced.

As shown in Figs. 1 and 4, the free side of the spring is adjusted almost to its extreme lowermost position and the level of liquid in the reservoir 6 is almost at its highest limit. The farther downward adjustment of the spring, in either instance is, in practice, comparatively slight, and as proportions of the parts are disclosed, will result in an overflow at the spray head.

It is to be borne in mind that the lower end of the valve 34, when said valve is closed, is in effect a fixed stop to limit the pivotal movement of the float, engaging the same within the confines of the spring 36, and that the amplitude of movement of the float necessary to close the valve is regulated by varying the location of the pivot point 39 of the float with relation to this fixed stop. The amplitude of movement of the float is reckoned as the degree of movement of the free side thereof, and obviously, by such degree as the pivot 39 is placed above the fixed stop, by a corresponding degree will the amplitude of movement of the float be reduced, since the float will all the earlier in its pivotal movement engage and close the valve 34 and be held against further movement thereby. Similarly, if the pivot 39 is lowered, as by depressing the free side of the spring 36, the float will have a greater pivotal movement for its engagement with and closing of the valve 34 will be correspondingly later than in the first instance set forth.

A spring held priming pin 48 is provided as an advantageous collateral feature of the float feed mechanism, in whatever connection the same may be used. The use of the priming pin 48 in the present connection is not, strictly speaking, essential, although under certain circumstances it may be found advantageous. The pin 48 is employed to depress the free side of the spring 36 and to allow the valve 34 to open, when it is desired to flush the carbureter. It will be understood that the same operation could be carried out with the pin 43. Inasmuch, however, as the use of the pin 43 for this purpose would necessitate the readjustment thereof, the provision and use of the pin 48 is of advantage in that the flushing operation may be carried out without disturbing the adjustment of any of the parts. In the use of the pin 48, the spring 36 is held depressed in the manner stated, and the liquid fuel fills the float chamber and overflows at the spray nozzle. The rise of the liquid in the float chamber of course has a tendency to raise the float 38 but such tendency is counteracted by the depressed position of the spring. When the pin 48 is released, the spring assumes its normal position, as governed by the pin 43 which has been set to the desired adjustment and the float 38 is allowed to rise and close the valve 34, thereby shutting off the further supply of liquid.

Fig. 1 discloses the preferred form of means for proportionately regulating the mixture. In this construction, the strangler element is constituted of a spray head 49 which surrounds the sleeve 18 and is slidable in either direction thereon. The head 49 has an interior cored out portion 50 of greater diameter than the sleeve 18 to establish communication between the radial openings 51 formed approximately mid-way of the length of said sleeve and the radial discharge openings 52 provided in the enlarged lower end portion 53 of the spray head. The latter is formed with a series of depending spaced projections 54, preferably four, which straddle the bar 14 loosely in order to prevent binding of the parts. Only one bar 14 appears in Fig. 1, but two of such bars may be advantageously employed, this arrangement being shown in Fig. 4, in which the bars 14 intersect at a central point, the ducts 16 thereof communicating with one another at such central point and likewise with the duct 17 in the nozzle 15. Means are provided for raising the strangler element in the initial adjustment thereof, and, as shown in the drawings, such means preferably comprises a follower ring 55 which is threaded in the flange 8 and which is formed at its outer end

with a head 56 having notches 57 therein, a spring pawl 58 engaging in the notches 57. The ring 55 at its upper end engages a series of coincident shoulders 59 formed on the projections 54 and in such engagement raises the spray head 49 or serves as a stop to limit the downward movement thereof. The bars 14 also serve as stops for the absolute limit of the downward movement of the head 49 and the flange 18[a] limits the upward movement of said spray head. In this preferred form of the invention the shell 4 is the companion part with which the head 49 coöperates and accordingly said shell is of gradually restricted interior dimension at its lower end, the inner face thereof tapering downwardly as at 60. The enlarged lower end portion 53 of the head 49 coöperates with the tapered face 60 to define the annular air passage or throatway 61, the dimensions of which are variable in accordance with the different positions assumed by the head 49. When the suction is weakest the head 49 will assume its lowermost position and the throatway 61 will be of its most restricted dimensions. As the suction increases in strength the head 49 will be raised in proportion and the throatway 61 will be proportionately enlarged in size. In this manner variations in the degree of suction are compensated for by movement of the strangler element to correspondingly regulate the size of the air passage or throatway. When the carbureter is working at about one-third of its full capacity the strangler element will be drawn to the limit of its upward movement and will be held at such limit as long as the charge is maintained at, or increased above, one-third of the capacity of the carbureter, but should the charge fall below this amount, the force of suction will not be sufficient to maintain the strangler element at its uppermost limit and said element will then move downward by gravity, assuming a position which is proportionate to the degree of suction in the mixing chamber 7.

The modified construction shown in Fig. 4 departs from the preferred form above described only in the construction and arrangement of the strangler element and certain parts which are adjuncts thereof, but the general construction and arrangement and the basic principles underlying the operation are preserved. In this construction the spray head is designated 49[a] and is formed as a stationary enlargement of the lower end of a sleeve 18[b] corresponding to the sleeve 18. The sleeve 18[b] has its upper end fitted in the angular mouth of the pipe 20 and at its lower end rests upon the bars 14. The nozzle 15 is received within the head 49[a], the latter being provided with radial discharge openings 52[a]. The strangler element is designated by the numeral 62 and is in the form of a tube, the inner face of which is oppositely tapered downwardly and upwardly from its respective upper and lower ends as at 63 and 64, the faces 63 and 64 meeting a cylindrical central face 65. The tube 62 is of greatest thickness at its face 65 and when said tube is in its lowered position the face 65 surrounds the head 49[a], the air passage or throatway occurring between said tube and said head being designated 61[a] and being most constricted when the tube is in its lowered position and of variably increased size in accordance with the different positions of the tube when it is raised. The tube 62 is formed with projections 54 similar to those described and said tube is raised by the follower ring 55, in the same manner as the head 49. The efficient size of the throatway 61[a] is controlled by the faces 65 and 64, the face 63 being upwardly flaring and serving to effect a more thorough distribution and breaking up of the gaseous mixture. The tube 62 fits snugly in the shell 4, and its maintenance in a raised position is had by the pressure of the air flowing over the head 49[a] and under the face 64. The upward movement of the tube 62 is limited by the pipe 20 as a stop and its downward movement is limited by the ring 55.

It will be understood that the amount of air passing through the ring 55 will depend upon the degree of suction in the mixing chamber 7 and that the amount of hydrocarbon passing into the mixing chamber through the ports of the spray head will also depend upon the strength of this suction. The valve 21 is provided for the purpose of regulating the degree of vacuum which it is possible to obtain in the suction chamber 19 with relation to some determined degree of suction in the chamber 7 in order that the amount of hydrocarbon which will be fed may be correspondingly regulated with relation to the said determined degree of suction in the chamber 7 and without throttling the feed duct for the hydrocarbon. By this means, when the parts have been adjusted to feed a certain proportion of hydrocarbon to a given volume of air in the chamber 7, this relation will be maintained under variations in the degree of suction created in the mixing chamber, or, in other words, the relative proportions of hydrocarbon and air fed to the mixing chamber from the suction chamber will be substantially maintained under variations of the amount of air drawn into the former.

The general operation will be readily apparent from the foregoing description. The suction influence in the mixing chamber 7 draws a supply of liquid fuel from the ducts 17 and 16 through the suction chamber 19, the proportionate degree of vacuum in the latter having been regulated by the valve 21. Air is likewise drawn in at the bottom of the carbureter through the ring 55, and this air

passes through the throat-way 61 or 61ª as the case may be into the chamber 7, mixing with the fuel therein, which fuel is in a finely divided state by virtue of having been discharged through the spray head. The gaseous charge thus formed passes from the carbureter by way of the outlet passage afforded by the annular flange 10.

In the use of the carbureter three adjustments are initially made, and when these adjustments have been made no further adjustments are necessary in any subsequent use. The first adjustment is that of the level of liquid in the reservoir 6. This is accomplished by turning the screw stem 43 to depress the free side of the spring 36 so that the float 38 will have its greatest amplitude of movement, at which time liquid will fill the reservoir sufficiently to cause an overflow at the spray head. The stem 43 is then turned to allow the free end of the spring to have its natural upward movement until the overflow at the spray head ceases. This adjustment gives the maximum height for the level of the liquid in the reservoir 6. The motor is then started at about half speed and the strangler element is automatically moved against its upper stop, *i. e.*, the flange 18ª or the pipe 20. At this stage the second adjustment, that of the air valve 21, is made in the manner stated in order that the proper mixture may be had, and in order that the degree of vacuum in the chamber 19 may be in some determined and advantageous proportion to a determined degree of suction in the mixing chamber 7 as previously explained. The motor is then throttled to low speed to allow the strangler element to fall to its lowest position. The third adjustment which is that of the strangler element is now made. When said strangler element is in its lowermost position, if the charge is too rich, the strangler element is raised by means of the ring 55 until the throatway is of the necessary size to admit the proper amount of air. Should the strangler element be raised so far as to produce too weak a charge, said element is lowered until the area of the throatway is restricted as much as is necessary to assure of the proper amount of hydrocarbon being drawn into the charge. Should it be necessary to lower the fluid level in the reservoir 6, the stem 43 is "slacked off" so as to allow the free end of the spring 36 to rise. This can be done without stopping the action of the motor. These three adjustments having been made, the carbureter will give a correct mixture throughout its entire range, *i. e.*, from its lowest to its maximum capacity.

The construction is readily set up and dismantled; the automatic action is simple and very sensitive in its responses to pressure variations, and furthermore, durability and practicability are assured by the elimination of adjustable needle valves or spring loaded parts.

While the invention has been shown as applied to a carbureter of the "straight-way" type, its use is of course not limited to this type, since by apparent modifications the principles may be preserved in connection with other forms.

Having fully described my invention, I claim:—

1. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a liquid supply nozzle located centrally and axially of said mixing chamber, said mixing chamber having an inlet for air and an outlet for gas, a strangler part movable freely and axially of the mixing chamber, a companion relatively stationary part concentric to the strangler part and defining therewith a throat-way through which air passes prior to its mixture with the liquid fuel discharged from said nozzle, one of said parts having an inclined face forming a wall of said throatway, said strangler part being moved by the influence of the suction in the mixing chamber, to proportionately increase the effective size of said throatway and exteriorly manipulatable manually operated means for adjustably moving said strangler part in the direction of its movement by suction influence and for supporting said strangler part in the positions into which it is adjustably moved.

2. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a liquid discharge nozzle disposed axially and centrally of the shell and including a tubular part having openings for the discharge of liquid in a spray, said mixing chamber having an inlet for air and an outlet for gas, a spray head surrounding said tubular part and movable axially thereof and of said mixing chamber, said spray head having openings therethrough to cause the discharge of liquid in a spray into the mixing chamber and having a cored out bore establishing communication between the openings in said tubular part and the openings in said spray head, said spray head serving as a strangler part, and a relative stationary companion part associated with said spray head and defining therewith a throatway through which air passes prior to its mixture with the discharge liquid fuel, one of said parts having an inclined face forming a wall of the throatway, said spray head being movable by the influence of the suction in said mixing chamber to proportionately increase the effective size of said throat-way.

3. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a discharge nozzle disposed axi-

ally of the mixing chamber, a spray head movable axially of the mixing chamber, having communication, in any position, with said nozzle and being provided with apertures to transfer the liquid from the nozzle to the mixing chamber, said spray head serving as a strangler part and being moved by the influence of the suction in the mixing chamber, and a relatively stationary companion part within the mixing chamber 8 associated with the spray head to define therewith a throatway through which air passes prior to its mixture with the liquid discharged into the mixing chamber from said spray head, the latter in its movement by suction influence increasing the effective size of said throatway.

4. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a discharge nozzle disposed axially of the mixing chamber, a spray head movable axially of the mixing chamber and having communication in any position with said nozzle to transfer hydrocarbon from the latter to the mixing chamber, said spray head serving as a strangler part and being moved by the influence of the suction in the mixing chamber, a relatively stationary companion part disposed in the mixing chamber and associated with the spray head to define therewith a throatway through which air passes prior to its mixture with the liquid discharged from said spray head, the latter in its movement by suction influence increasing the effective size of said throatway, and exteriorly manipulatable means for holding said spray head against movement to decrease the size of the throatway from selected positions along the extent of its movement by suction influence.

5. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a discharge nozzle disposed axially of the mixing chamber, a spray head movable axially of the mixing chamber and having communication in any position with said nozzle to transfer hydrocarbon from the latter to the mixing chamber, said spray head serving as a strangler part and being moved by the influence of the suction in the mixing chamber, a relatively stationary companion part disposed in the mixing chamber 8 associated with the spray head to define therewith a throatway through which air passes prior to its mixture with the liquid discharged from said spray head, the latter in its movement by suction influence increasing the effective size of said throatway, and manually operated follower means for adjustably moving said spray head in the direction of its movement by suction influence, said means comprising a ring threaded into the inlet end of the mixing chamber and engaging the end of said spray head to effect movement thereof.

6. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a tubular member disposed axially of the shell and formed with discharge openings, a nozzle disposed axially of the shell and communicating with the tubular member, a member carrying the nozzle and formed with a liquid duct, a stationary stop member secured to the upper end of the tubular member, a strangler part movable axially of the mixing chamber and concentrically surrounding the tubular member, a relatively stationary companion part defining, with the strangler part, a throatway through which air passes prior to its mixture with the liquid discharged from said nozzle, one of said parts having an inclined face forming a wall of said throatway, said strangler part being movable under the influence of the suction in the mixing chamber toward said stop member, and an adjustably movable stop member for limiting the movement of the strangler part in a direction away from the stationary stop member.

7. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, means for causing the discharge of liquid fuel into said mixing chamber, a transverse member bridging the lower end of the mixing chamber, a strangler part movable axially of the mixing chamber and formed with depending spaced extensions straddling said transverse member and guiding said strangler part in its movements, a stop member for limiting the upward movement of said strangler part, said transverse member forming an absolute limit to the downward movement thereof, and a relatively stationary companion part defining, with the strangler part a throatway through which air passes prior to its mixture with the discharged liquid, one of said parts having an inclined face forming a wall of said throatway, said strangler part having upward movement under suction influence to increase the efficient size of said throatway and having downward movement by gravity.

8. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, means for causing the discharge of liquid fuel into said mixing chamber, a transverse member bridging the lower end of the mixing chamber, a strangler part movable axially of the mixing chamber and formed with depending spaced extensions, straddling said transverse member and guiding said strangler part in its movements, said shell having an annular threaded flange inclosing said extensions, a stop member for limiting the upward movement of said strangler part, a relatively stationary companion part associated with the strangler part and defining therewith a throatway through which air passes prior to its mixture with the discharged liquid, one of said parts

having an inclined face forming a wall of said throatway, said strangler part having upward movement under suction influence to increase the efficient size of said throatway, and a member having a threaded adjustable engagement in said flange and arranged to engage said extensions to limit the downward movement of the strangler part.

9. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a tubular member disposed axially of the mixing chamber and having discharge openings, a liquid supply nozzle communicating with said tubular member, an angularly disposed air tube connected to the upper end of said tubular member, a valve controlling the admission of air to said tube, a hydrocarbon reservoir associated with the mixing chamber and a bar extending transversely of the mixing chamber and having a duct communicating with the reservoir and with said nozzle.

10. In a carbureter of the type set forth, in combination, a lower section having a liquid discharge nozzle therein and having also an air opening, an upper section detachably secured to the lower section and having an opening for the passage of the carbureted fuel, a valved air tube secured in the upper section and a separably related apertured tubular member extending between the air tube and the nozzle.

11. In a carbureter of the type set forth, in combination, a lower section provided with a mixing chamber, a hydrocarbon reservoir adjacent the lower section, an upper section detachably secured to the lower section, and forming a closure for the hydrocarbon reservoir, a bar extending transversely of the mixing chamber and having a duct in communication with said reservoir, a nozzle carried by said bar and disposed axially of the mixing chamber, a sleeve surrounding said nozzle and provided with spray openings, said upper section having a bore axially alined with the mixing chamber, and a horizontal air pipe projecting into said bore and receiving the upper end of said sleeve.

12. In a carbureter of the type set forth, in combination, a lower section provided with a mixing chamber, an upper section having a bore alined with the mixing chamber, a nozzle disposed axially of the mixing chamber, a sleeve surrounding the nozzle and formed with discharge openings, an air pipe set in the wall of the upper section and projecting horizontally into the bore thereof, means for supporting the lower end of said sleeve, said air pipe receiving the upper end of said sleeve, an axially movable spray head surrounding said sleeve and having communication in any position with said discharge openings, said air pipe limiting the upward movement of said spray head under the suction influence in the mixing chamber, means for limiting the downward movement of said spray head, the latter forming a strangler part and a relatively stationary companion part defining, with the spray head, a throatway through which air passes prior to its mixture with the liquid discharged from said spray head, one of said parts having an inclined face whereby the upward movement of the spray head increases the efficient size of the throatway.

13. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a nozzle disposed axially of the shell, a part detachably secured to the shell and having a bore alining with the mixing chamber, an air pipe set into said part and projecting into said bore, and a tubular member disposed axially of the mixing chamber and detachably associated with the air pipe and the nozzle to establish communication therebetween, said tubular member having discharge openings above the nozzle.

14. In a carbureter of the type set forth, in combination, a shell having a mixing chamber therein, a part detachably secured to the shell and having a bore alined with the mixing chamber, an air pipe set into said part and projecting into said bore, a valve controlling the outer end of said air pipe, a nozzle disposed axially of the mixing chamber, and a tubular member connecting the air pipe and the nozzle, said tubular member having discharge openings.

15. In a carbureter of the type set forth, a part forming a suction chamber, a pipe for supplying air to said suction chamber, said pipe being formed with a valve seat and a plug valve threaded into the end of said pipe and having a valve face for coöperation with said seat, said valve having air openings therethrough and extending from its exposed end to said valve face.

16. Means for regulating the proportion of air in a carbureted mixture of liquid fuel for explosive engines comprising a hollow member having an air inlet and having a suction influence created therein by the operation of the engine, means forming a variable throatway through which the entering air must pass and comprising an unattached strangler element freely movable in one direction by the suction influence to increase the size of the throatway and in another direction by gravity to reduce the size of the throatway and a stationary companion element with respect to which the strangler element is movable, and exteriorly manipulated adjustable stop means for limiting the movement of the strangler element by gravity.

17. In carbureters of the type set forth, in combination, a lower section having a mixing chamber, an upper section detachably connected to the lower section and com-

municating with the mixing chamber thereof, one of the sections having an inlet for air and the other section having an outlet for the carbureted mixture, a central unattached tubular member, means carried by each section and engaging the tubular member to hold the same against displacement, one of the means having a hydrocarbon nozzle which discharges into the tubular member, the latter being perforated, a vertically movable strangler part concentrically surrounding the tubular member and a stationary companion part having a face inclined relatively to the strangler part and forming with the latter an air throatway, the size of which is varied in accordance with the direction and degree of movement of the strangler part.

18. Means for regulating the proportion of air in a carbureted mixture of liquid fuel for explosive engines comprising a hollow member having an air inlet and having a suction influence created therein by the operation of the engine, means forming a variable throatway through which the entering air must pass and comprising two concentric parts having relatively inclined faces, one of the parts being unattached and being freely movable axially of the other part, in one direction by the suction influence and in an opposite direction by gravity, to vary the efficient size of the throatway, and an exteriorly manipulatable threaded ring axially alined with the movable part, unattached thereto and operable to effect a movement thereof relative to the other part.

In witness whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANKLIN W. HAGAR.

Witnesses:
NOAH W. COOPER,
LAURA WRIGHT.