No. 876,210. PATENTED JAN. 7, 1908.

J. H. MILLER.

CARBURETER.

APPLICATION FILED AUG. 6, 1906.

Fig. 1.

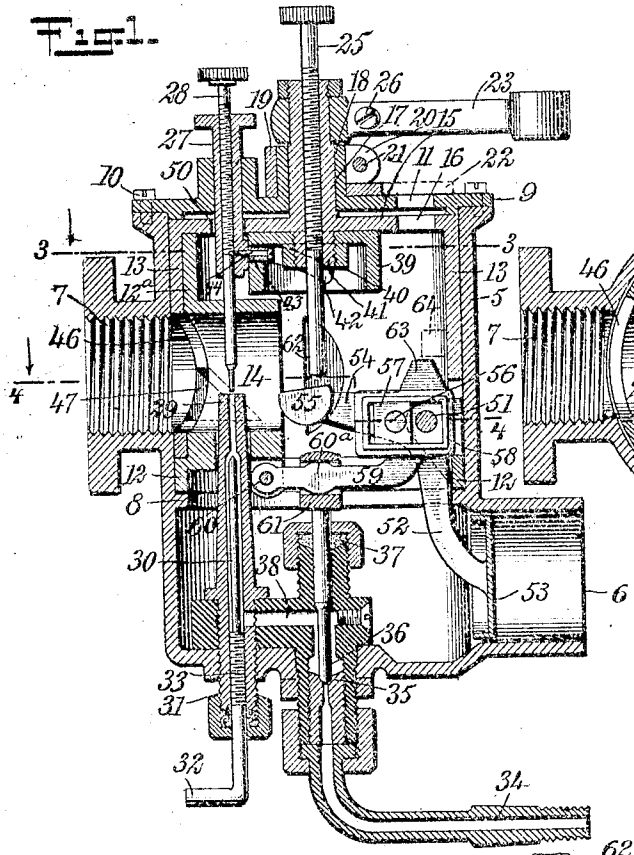


Fig. 4.

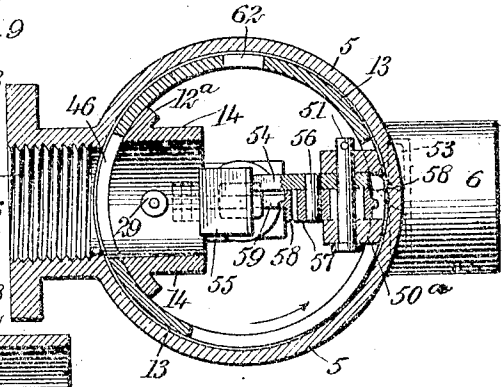


Fig. 2.

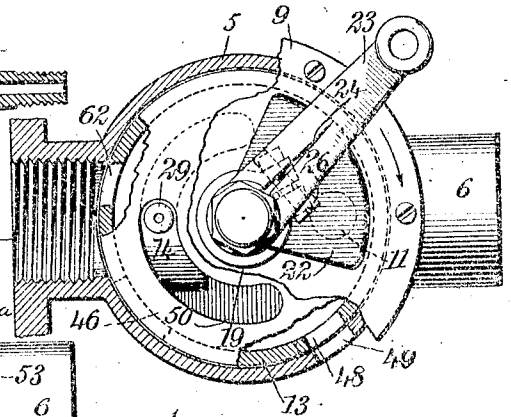


Fig. 3.

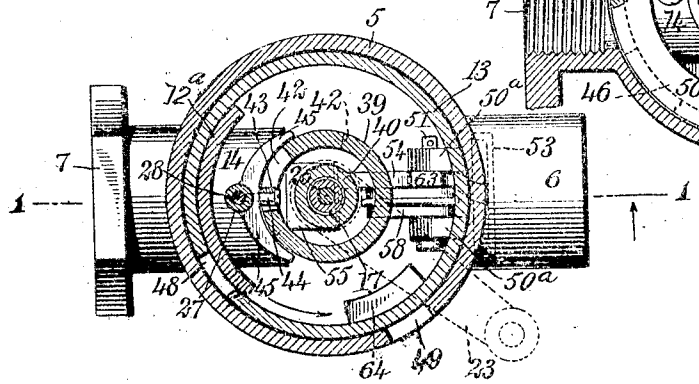
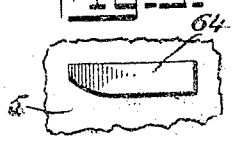


Fig. 5.



WITNESSES

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CARBURETER.

No. 876,210. Specification of Letters Patent. Patented Jan. 7, 1908.

Application filed August 6, 1906. Serial No. 329,379.

To all whom it may concern:

Be it known that I, JOHN H. MILLER, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and Improved Carbureter, of which the following is a full, clear, and exact description.

My invention relates to carbureters, and more particularly to carbureters of the kind used in connection with internal combustion engines, my special object being to improve the control over the admission of combustible vapor and air, so as to suit different conditions under which the engine may at different times be running.

Among the several objects of my invention are the following: 1. To provide efficient means whereby the volume of air drawn in by the engine may within certain limits be made proportionate to the inflow of combustible vapor or other explosive charge. 2. To admit cold air into the carbureter while the throttle is closed, and the engine runs for the time being by its momentum. 3. To increase disproportionately the supply of combustible vapor when the engine is running at a high speed and consuming comparatively large quantities of the vapor. 4. To provide various devices for adjusting the inflow and controlling the regulation of both the air and the combustible vapor.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical section on the line 1—1 of Fig. 3, through a carbureter made in accordance with my invention, and showing the positions occupied by the various movable parts if the throttle lever 23 is in the position indicated by dotted lines in Fig. 3, the throttle being open to its greatest extent; Fig. 2 is a fragmentary plan view of the carbureter, certain parts being broken away and the throttle lever 23 and other movable parts being in such position that the throttle is closed; Fig. 3 is a horizontal secton upon the line 3—3 of Fig. 1, looking in the direction of the arrow and showing more particularly how the needle valve 28, together with its casing 27, is moved so as to regulate the discharge of combustible liquid from the spraying nozzle 29; and Fig. 4 is a section upon the line 4—4 of Fig. 1, looking in the direction of the arrow and partly broken away so as to show the manner in which certain movable parts are pivotally mounted and otherwise connected. Fig. 5 is a fragmentary elevation showing the shape of the arcuate lug 64, this lug being beveled upon its under side.

A cylindrical casing 5 is provided with a inlet neck 6 and with an outlet neck 7. Mounted internally of the casing 5 and integral therewith is an annular shelf 8 forming a support for certain parts hereinafter mentioned. The casing 5 is provided with a removable head 9 secured thereto by means of fastenings 10, and is also provided with a port 11 of circular form. Revolubly fitted into the casing 5 and resting upon the annular shelf 8 is a ring 12 provided with a wall 12^a of arcuate form projecting upwardly therefrom, this wall having an annular sleeve 14 integral therewith and projecting inwardly therefrom. A large valve 13 of substantially cylindrical form fits into the casing and may, within certain limits, be turned relatively thereto. This valve fits intermediate of the wall 12^a and the part of the casing 5 immediately adjacent thereto, as will be understood from Figs. 1 and 4. The upper end of the valve 13 is provided with a head 15 integral therewith, this head having a circular port 16 adapted to register with the port 11 of the casing head 9 when the cylindrical valve 13 is turned into proper position to accomplish this result. Integral with the head 15 and projecting upwardly therefrom is a tubular stem 17 threaded internally. This stem 17 is encircled by a neck 18 projecting upwardly from the head 9 and thus forming a suitable bearing in which the tubular stem 17 may be turned. A clamping sleeve 19 is provided with spring lugs 20 connected by a screw bolt 21 in such manner that by loosening or tightening the bolt the tension of the spring lugs upon the neck 18 may be tightened or relaxed at will. A valve 22 of arcuate form is formed integrally with the clamping sleeve 19 and is adapted to cover or uncover the port 11 according to the adjustment of the valve 22 relatively to the head 9. That is to say, the clamping sleeve 19 may be loosened by manipulating the bolt 21, and the arcuate valve 22 may be moved in relation to the sleeve 18, and so tightened by means of the bolt 21 that the port 11 will be wholly or partially covered when the tubular stem 17 occupies a predetermined position relatively to the casing 5. The throttle lever is shown

at 23 and is mounted upon the tubular stem 20. This throttle lever is provided with a slot 24, or in other words, is bifurcated, and is provided with a screw bolt 26 whereby it may be tightened relatively to the tubular stem 17. An adjusting screw 25 passes downwardly through the tubular stem 17, which is threaded internally for the purpose of receiving it. By turning the screw 25 it may be raised or lowered, as desired. A sleeve 27 projects through the head 9 and is slidable in relation thereto. A needle valve 28 extends through the sleeve 27, these two parts being threaded as will be understood from Fig. 1. By turning the needle valve 28 it may be raised or lowered relatively to the sleeve 27. The spraying nozzle is shown at 29 and registers with the lower end of the needle valve 28. Mounted within the spraying nozzle 29 is a needle valve 30 provided with a revoluble handle 32 and with a threaded portion 33 which engages a mating portion 31 of the spraying nozzle 29. By turning the handle 32 the discharge capacity of the spraying nozzle may be controlled at will.

The inlet pipe for the gasolene or other hydrocarbon liquid to be volatilized is shown at 34, and is connected with the valve seat 35, associated with which is the needle valve 36. When the carbureter is idle the needle valve 36 rests upon the seat 35, but when the carbureter is in action the valve 36 is lifted periodically so as to allow ingress of the hydrocarbon liquid. The needle valve 36 is encircled by a stuffing-box 37 which prevents the hydrocarbon liquid from entering the parts of the carbureter in which its presence is not desired. A passage 38 is in communication with the inlet pipe 34 whenever the needle valve 36 is raised. This passage 38 supplies the hydrocarbon liquid to the spraying nozzle 29. A small cam 39 is by means of a threaded hub 40 and a boss 41 secured rigidly against the top face of the cylindrical throttle valve 13, as will be understood from Fig. 1. This cam 39 is provided with a spiral slot 42, and fitting into the slot is a roller 43 mounted upon a stem 44. The sleeve 27 is provided with guards 45 of arcuate shape which extend partially around the cylinder 39 and have a curvature corresponding to that of the exterior of said cylinder. When the cylinder 39 is turned the guards 45 prevent rotation of the sleeve 27, and the roller 43 is thus always held in proper position relatively to the slot 42. The rotation of the cylinder 39 therefore simply raises or lowers the sleeve 27 and its accompanying needle valve 28. The large cylindrical valve 13 is provided with an opening 46 adapted to register with the opening in the outlet sleeve 7. This opening 46 has a substantially V-shaped extension 47, or in other words, merges into a V-shaped mutilation as will be understood from Fig. 1. The cylindrical valve 13 is further provided with an opening 48 which registers with a somewhat similar opening 49 in the casing 5. These openings are so positioned that they register with each other when the throttle lever 23 is in the position indicated in Fig. 2, or in other words, when the throttle is closed. When these openings are out of registry no air can pass through them, and as the throttle lever 23 is adjustable the openings may be staggered relatively to each other so as to admit varying quantities of air. The valve 13 is also provided in its top with an arcuate slot 50 through which passes the sleeve 27. The valve 13 can be turned to about one-quarter of a revolution, this much freedom being permitted by the length of the slot 50. The cylindrical valve 13 is further provided with lugs 50^a integral therewith and projecting internally therefrom. Carried by these lugs is a pin 51. Pivotally mounted upon this pin is a swinging arm 52 provided with a baffle plate 53 and with an extending portion 54 having a weight 55. By virtue of the weight the baffle plate 53 is normally held within, but out of engagement with, the inlet sleeve 6 so as to considerably restrict the inflow of air to the carbureter. When, however, the swinging arm 52 is tilted and the weight 55 raised, the air space around the baffle plate 53 is greatly increased. That is to say, there is always a clear space around the baffle plate 53 whenever the latter is in its normal position, and this space increases whenever the baffle plate swings to the left, according to Fig. 1. A pin 56 is mounted rigidly upon the portion 54 of the swinging arm 52 and extends through a square block 57 into which it neatly fits. This square block serves as a bearing and fits into a rectangular bearing plate 58 carried upon the outer or free end of a swinging arm 59. This arm is pivoted at 60 and is provided with a rotund portion 60^a. Encircling this rotund portion is a bearing sleeve 61 connected with the needle valve 36 and capable of lifting the latter from its seat.

When the baffle plate 53 is moved to the left according to Fig. 1, the pin 56 rises, the arm 59 swings upward upon the pivot 60, and the needle valve 36 is thus lifted. The weight 55 therefore normally maintains the needle valve 36 upon its seat. The cylindrical valve 13 is still further provided with a port 62 of substantially crescent shape as indicated in Fig. 1. When the valve 13 is moved into one of its extreme positions, that is to say, when the throttle lever 23 is moved into the position indicated in Fig. 2 so that the throttle is closed, the valve 13 moves still further after the closure takes place, and the crescent-shaped port 62 registers with a portion of the opening through the sleeve 14. This occurs at the same instant when the openings 48, 49 are in registry with each

other. When this takes place the air can pass through the ports 48, 49, and also through the port 62 and 14. The engine thus aspires pure air, which tends to cool it without consuming any fuel. The suction from the engine, therefore, produces the desired effect. The vertical play of the weight 55 and consequently the lateral swing of the baffle plate 53 is regulated by adjusting the screw 25 by hand. A lug 63 is mounted upon the lever 52, and mounted within the cylindrial valve 13 and at a slightly higher level than the lug 63, is a lug 64 of arcuate form. When the throttle is closed, that is, when the throttle lever 23 occupies the position indicated in Fig. 2, the lug 64 is directly over the lug 63 and the baffle plate 53 is unable to swing backward from the sleeve 6. When, however, the throttle is opened to any extent the lug 64 moves out of the way of the lug 63 and the baffle plate 53 is therefore free to swing.

The operation of my device is as follows:—The needle valves 28, 30 and the screw 25 having been adjusted properly, the engine is started up by moving the throttle lever 23 from its position indicated in full lines in Fig. 2 toward the position indicated by dotted lines in Fig. 3, the degree of movement of the throttle lever controlling the speed of the engine. The gradual movement of the throttle lever 23 from its position indicated in Fig. 2 causes the cylindrical cam 39 and its slot 42 to gradually raise the sleeve 27, and consequently to lift the needle valve 28 from its seat. The higher this sleeve and the needle valve are raised the more easily can the hydrocarbon liquid pass through the inlet pipe 34, the passage 38 and the spraying nozzle 29, which it does by its own gravity. The suction from the engine now takes place, and the baffle plate 53 is caused to swing to the left according to Fig. 1 in the manner above described. The greater the suction exerted by the engine the further is the movement of the baffle plate 53 and the higher the lift of the needle valve 36 so as to increase the inflow of the liquid hydrocarbon. The further the throttle lever 23 moves from its position indicated by full lines in Fig. 2 the greater becomes the flow of air through the sleeve 14. The V-shaped mutilation 47 into which the opening 46 merges allows the virtual area to be increased or decreased very gradually. That is to say, as the center of the opening gradually moves toward or from the center of the outlet sleeve 7, the V-shaped mutilation 47 of the opening 46 registers more or less perfectly with the opening extending through the outlet sleeve 7. When the throttle lever 23 is so far turned that no part of the mutilation 47 extends into the open space the suction of the air within the carbureter is totally cut off. When this occurs the needle valve 28 completely closes the spraying nozzle 29. By moving the throttle lever 23 still further, or in other words, into the position indicated by dotted lines in Fig. 3, so as to leave the throttle wide open, the valve 22 at last uncovers the port 11. This allows an inflow of air through the ports 11 and 16, and increases, disproportionately, the supply of air to the carbureter as the engine attains its maximum speed. Since the additional supply of air thus admitted at high speeds may not be suitable for all conditions, the adjustment of the valve 22 relatively to the tubular stem 17 permits the inflow of air through the ports 11 and 16 to be adjusted at will as above described.

As will be seen from the above description, the distribution of air and combustible vapor may be regulated with great precision and adapted to a wide range of conditions. When the supply of liquid hydrocarbon is totally cut off in the throttle the supply of air, considered as a factor in explosion, is also cut off. If desired, after this is done the operator may, by turning the throttle lever still further in the direction necessary for closing, admit at will varying quantities of cold air for cooling the carbureter. When the engine runs at maximum speed the supply of air may at will be increased disproportionately to the supply of hydrocarbon vapor. All of these results are attained by simply manipulating the throttle lever. It will also be noted that, as the arcuate lug 64 is beveled upon its under face the play of the lug 63 is gradually restricted as the adjacent end of the lug 64 passes over it. That is to say, as the rotation of the valve 13 brings the lug 64 over the lug 63 the progressive movement of the lug 64 gradually limits more and more the vertical play of the lug 63. In doing this, the swing of the baffle plate 53 is gradually curtailed. Vice versa, when the valve 13 is turned in the opposite direction the swing of the baffle plate becomes of greater and greater amplitude until the lug 64 is entirely off the lug 63. These gradual changes of movement in affecting the baffle plate 53 also affect the lever 59 and consequently affect the valve 36. It follows, therefore, that the play of the valve 36 and the swing of the baffle plate 53 are proportionate in amplitude so that the action of the lug 64 serves to some extent as a throttle control. If, for any reason, the cam 39, or any of its immediate connections, should be disabled they can be removed, and the supply of air and fuel may be controlled through the agency of the lug 64 now serving as an auxiliary throttle.

It will be noted that when the throttle is wide open, that is, when the throttle lever 23 is in its extreme position, indicated by dotted lines in Fig. 3, the needle 28 is clear of the nozzle 29, and so far as the spraying is concerned, the flow is at a maximum al-

though this maximum is controllable by adjustment of the needle 28. It will also be noted in this connection, that the baffle plate 53 swings further to the left according to the view shown in Fig. 1, when the throttle is wide open, than when partially closed. It follows, therefore, that the baffle plate 53 only attains its full swing to the left when the spraying nozzle 29 is open to its maximum extent under a given adjustment of the needle 28. There is, therefore, a definite relation existing between the quantity of air admitted by the swinging of the baffle plate 53, the quantity of fuel capable of issuing from the spraying nozzle 29, and the quantity of fuel permitted to pass the nozzle 36 which is controllable by the baffle plate 53. In other words, there is a double automatic regulation of the flow of the fuel passing into the carbureter through the spraying nozzle. By this arrangement the main action of the engine is greatly improved, and the control of the operator over the speed and steadiness of running is increased.

The construction above described promotes regularity in the flow of the hydrocarbon liquid. In many carbureters it happens that variations in the hydrostatic pressure of the carbon liquid, due to differences in the level thereof, cause the liquid to flow into the carbureter at greater velocity at one moment than at another. I find, however, that when my construction is used, the inflow of liquid is comparatively steady and reliable, even in instances where there is apparently but little tendency for the liquid to flow by its own gravity into the carbureter.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a carbureter, the combination of an inlet for a hydrocarbon liquid, an air inlet for the purpose of bringing air into contact with said hydrocarbon liquid so as to form an explosive mixture, a movable baffle plate for partially obstructing the flow of air through said air inlet, a lever supporting said baffle plate, a cylindrical member encircling said lever, and a lug of arcuate form mounted upon said cylindrical member and provided with a bevel face for controlling quantitatively the degree of movement of said lever.

2. In a carbureter, the combination of a spraying nozzle for admitting liquid hydrocarbon, an inlet sleeve for admitting air, a baffle plate of smaller diameter than said inlet sleeve for controlling the admission of air therethrough, mechanism connected with said baffle plate for controlling the supply of liquid hydrocarbon to said spraying nozzle, a throttle, and means controllable by said throttle for regulating the discharging capacity of said spraying nozzle.

3. In a carbureter, the combination of a casing to be connected with an engine inlet, a swinging baffle for admitting varying amounts of air into said casing, a throttle for opening and closing communication between said casing and said engine inlet, and mechanism controllable by movements of said throttle for restricting movements of said baffle plate.

4. In a carbureter, the combination of a spraying nozzle for vaporizing a liquid hydrocarbon, an inlet for admitting air into contact therewith, a baffle plate movable by pressure and partially obstructing said inlet, said baffle plate being free to swing so as to vary the capacity of said inlet, a throttle for controlling the degree of suction upon air passing said baffle plate, and mechanism connected with said baffle plate and controllable by the swing thereof for regulating the flow of hydrocarbon from said spraying nozzle.

5. In a carbureter, the combination of a casing, a spraying nozzle for vaporizing a liquid hydrocarbon, a valve for controlling the flow of said liquid hydrocarbon from said spraying nozzle, an engine inlet, an air inlet, baffle mechanism controllable automatically by the passage of air through said air-inlet so as to vary the capacity of the latter, a throttle for controlling communication between said engine-inlet and said air-inlet, and connections from said throttle to said spraying nozzle for enabling the position of said throttle to vary directly the capacity of said spraying nozzle.

6. In a carbureter, the combination of a casing provided with an air-inlet and with an outlet for discharging an admixture of air and vaporized hydrocarbon, a spraying nozzle for vaporizing said hydrocarbon, a movable baffle controllable automatically by the suction of the engine for admitting air to said spraying nozzle, and a valve connected with said baffle and controllable thereby for governing the flow of liquid hydrocarbon therefrom.

7. In a carbureter, the combination of a casing provided with an opening, a throttle valve movable in relation to said casing and provided with an opening adapted to register with said opening of said casing so as to admit air into said casing, a spraying nozzle for vaporizing liquid hydrocarbon, mechanism connected with said throttle valve for controlling the flow of hydrocarbon from said spraying nozzle, and mechanism connected with said throttle valve for the purpose of admitting air into said casing when said openings are out of registry with each other and said spraying nozzle is closed.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. MILLER.

Witnesses:
CLARENCE H. KNEELAND,
J. B. MAGUIRE.