A. HOWARTH.

CARBURETER.

APPLICATION FILED MAY 31, 1907.

922,145.

Patented May 18, 1909.

FIG. 1.

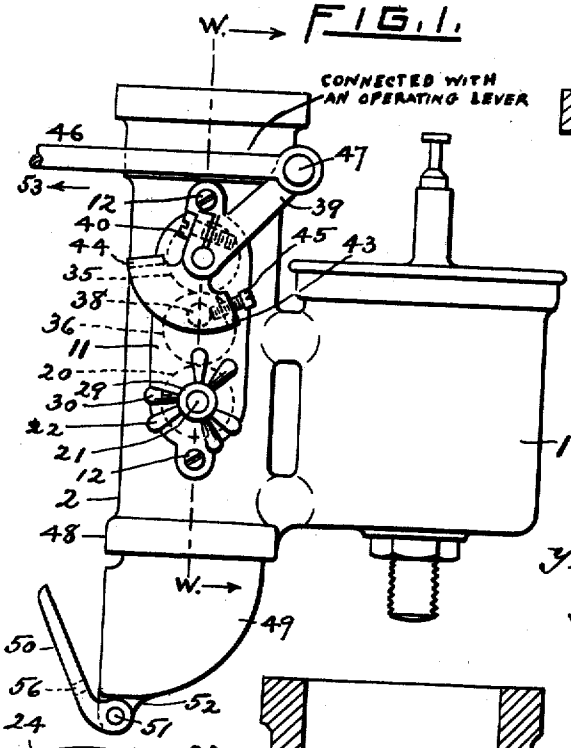


FIG. 2.

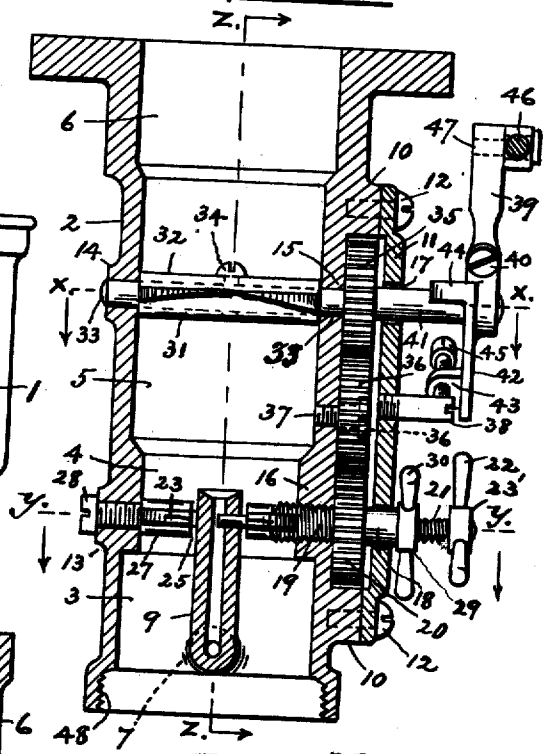


FIG. 3.

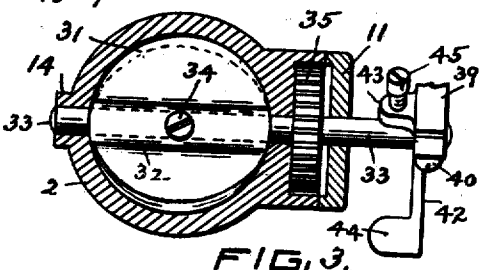


FIG. 4.

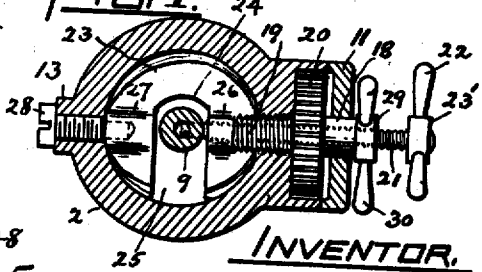


FIG. 6.

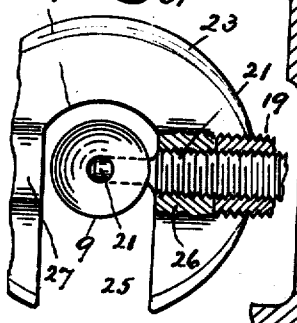
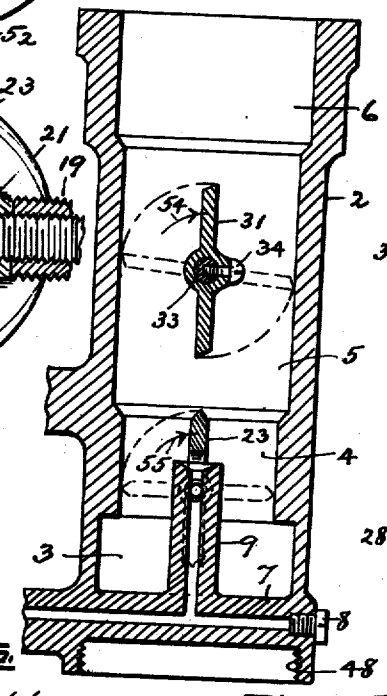


FIG. 5.



WITNESSES.

Charles P. Hannigan.

Annie E. Perce.

INVENTOR.

Albert Howarth

By Warren R. Perce

Atty.

UNITED STATES PATENT OFFICE.

ALBERT HOWARTH, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO STANDARD CARBURETER COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

CARBURETER.

No. 922,145. Specification of Letters Patent. Patented May 18, 1909.

Application filed May 31, 1907. Serial No. 376,616.

To all whom it may concern:

Be it known that I, ALBERT HOWARTH, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had therein to the accompanying drawings.

Like reference numerals indicate like parts.

Figure 1 is a side elevation of my improved carbureter. Fig. 2 is a sectional view of the same on line *w w* of Fig. 1. Fig. 3 is a sectional view of the same on line *x x* of Fig. 2. Fig. 4 is a sectional view of the same on line *y y* of Fig. 2. Fig. 5 is a sectional view of the same on line *z z* of Fig. 2. Fig. 6 is a plan view of the air valve and feed nozzle, with means of operating the needle valve to supply gasolene to the said nozzle, as seen on line *y y* of Fig. 2.

My invention relates to the class of carbureters, especially those adapted for motors in automobile vehicles and for other uses, and it consists of the novel construction, combination and arrangement of parts as hereinafter described and claimed.

In the drawings 1 denotes the gasolene feed chamber of the device, of usual construction, but as it forms no part of the present invention, it is not here further described.

The carbureter proper is inclosed in a tubular case 2, which has its bore made of different diameters to form what may be called the air chamber 3, the feed chamber 4, the carbureting chamber 5 and the throttle valve chamber 6, as shown in Figs. 2 and 5. The case 2 is provided with a flanged opening at its upper end and with a pipe therefrom (not shown) to conduct the gasolene vapor to the cylinder of the engine.

A gasolene feed pipe 7 passes from the feed chamber 1 at or near the bottom thereof and across the bottom of the carbureter, as best shown in Fig. 5. The outer end or bore of this pipe 7 is stopped by the screw plug 8, which may be removed, whenever desired, for cleaning the bore of said pipe, or for other purposes, as may be necessary. A nozzle 9 extends up vertically from the pipe 7 in the axial line of the carbureter, the bore of the nozzle opening into the bore of the pipe. At the top of the nozzle 9, the bore thereof is conically enlarged, so as to flare outwardly, to facilitate the discharge from the nozzle. The upper end of the nozzle 9 extends up into the feed chamber 4, about half-way.

The case 2 has the two bosses 10, and a cap or cover 11 is secured upon the same by means of the screws 12. The case 2 also has the two bosses 13, 14, which furnish bearings for the shafts of the air valve and throttle valve hereinafter described. Bearings 15 and 16 are also provided in the case 2, diametrically opposite to the bearings 13, 14, respectively, as seen in Fig. 2. The cap or cover 11 has apertures 17 and 18 in alinement with and registering with the bearings 15 and 16, respectively.

In the bearing 16, which is threaded, is mounted the tubular shaft 19 of a gear 20, the gear being fast upon the shaft. This shaft 19 is screw-threaded on its exterior surface, so as to be movable inwardly and outwardly in a longitudinal direction and extends through the aperture 18 of the cover or cap 11, and projects slightly beyond the same at its outer end, as seen in Figs. 2 and 4. The tubular shaft 19 also has its bore screw-threaded, as represented in Figs. 4 and 6, and a screw-threaded needle valve 21 engages therewith, so as to be longitudinally adjustable in position in the threaded bore of the tubular shaft 19. The outer end of the needle valve 21 has the radially extending handles 22, projecting from a head or collar 23', which is fastened upon said end of the needle valve. The shaft 19 with its gear 20 rotates, and also moves inward and outward longitudinally, thus carrying the needle valve 21.

A circular disk or valve 23, constitutes the adjustable air valve, mounted in the feed chamber 4. It has a central aperture 24, with a radial slot or opening 25, as illustrated in Figs. 4 and 6, and it is so mounted that the upper end of the nozzle 9 extends up through it at the central aperture 24, as seen in Figs. 2, 4, 5 and 6. The valve disk 23 has an integral boss 26, which has a threaded bore, and the threaded shank of the needle valve 21 passes through this boss 26, as shown most plainly in Fig. 6. Diametrically opposite to the boss 26, the valve 23 has another boss 27, which has a short tubular socket to receive the cylindrical shank or

end of a screw 28, the latter being engageable with a screw-threaded hole in the bearing 13, all as best seen in Fig. 4.

A check nut 29, having radial handles or spokes 30, is mounted on the threaded shank of the needle valve 21 in abutment with the outer end of the tubular shaft 19 of the gear 20, as shown in Fig. 4, to hold the needle valve in its adjusted position. By the pressure of the check nut 29 against the outer end of the tubular shaft 19 of the gear 20, the gear 20 and the needle valve 21 are locked together; and the slot in the inner end of the tubular shaft or hub 19, as already described, enables the air valve 23 to turn in unison with the needle valve 21. When the check nut 29 is loosened by turning of the handles 30 thereof, the needle valve 21 can be moved independently along its threads, through the bore of the tubular shaft 19, either inwardly or outwardly, so as to cause the inner end of the needle valve to project to any desirable extent into the bore of the nozzle 9. When the needle valve has been thus longitudinally adjusted, it is held in such adjusted position by tightening up the check nut 29, and is then rotatable by and in unison with the shaft 19, when the latter is turned.

As seen in Fig. 2, the inner end of the tubular shaft 19 is bifurcated or slotted longitudinally for a short distance, and so receives loosely the adjacent part of the valve disk 23 in such manner that the turning of the exteriorly-threaded shaft 19 causes the turning of said valve disk with it, the slot in the end of said shaft 19 being sufficiently wide to allow said end of the shaft to slide along the valve disk 23, without impairing its loose engagement with said valve disk for rotational purposes. Thus, as the needle valve 21 is in screw-threaded engagement with the tubular shaft 19 of the gear 20 and with the threaded boss of the air valve 23, both the needle valve 21 and the air valve 23 are rotatable simultaneously by operating the handles 22, because, when the check nut 29 is tightened up, the needle valve 21 and tubular shaft 19 are locked together, and are then rotatable simultaneously, to the extent of a quarter-turn, by means of the handle 22.

As shown in Fig. 5, the air valve 23 on its upwardly opening edge has a double bevel or V-shape, so that it merely touches the inner surface of the feed chamber in a single circumferential line, when closed to the position shown in Fig. 2. This feature, however, is reserved as subject matter of another application for Letters Patent.

The throttle valve is designated as 31 in the drawings. It has on each face a diametrical boss 32, through which the spindle or shaft 33 of said valve passes. A screw 34 fastens the valve 31 on the shaft 33. The shaft 33 is rotatably mounted in a bore in the boss 14 and in the aperture 15 of the case 2. The throttle valve 31 is a disk, slightly elliptical in shape. As the bore of the chamber 5, in which the throttle valve 31 is rotatably mounted, is circular, the ellipticity of said valve causes the valve to stand diagonally, when closed, as indicated by the dotted lines in Fig. 5. On account of this diagonal seating of the throttle valve 31, when closed, the two opening edges are slightly beveled, as shown in Fig. 5, to enable said edges to come into contact, when closing, with the portions of the tubular bore of chamber 5. On the portions of the edges of the valve disk 31 contiguous to the pivoting thereof the disk 31 has straight edges, as illustrated in Fig. 2. The bevels on the two opening edges of the valve disk 31 are oppositely directed, as shown in Fig. 5, to allow contact with the inner tubular surface of the chamber 5 in closing. The degree of such diagonal direction is preferably about 10° more than a right angle, as illustrated in Fig. 5, but any other degree may be used as desired. This feature of beveling the edge of the throttle valve is, however, reserved as subject matter for another application for Letters Patent. A gear 35 is mounted fast on the shaft 33. An idler or intermediate gear is mounted loosely on a screw 37 and meshes with the gears 20 and 35.

A stop pin 38 projects from outer side of the cap or cover 11. A lever arm 39 is secured upon the outer end of the shaft 33 by means of a close U-shaped end, which embraces the same and is pinched into locking engagement therewith by means of the screw 40. The shaft 33 is enlarged in the part 41 thereof as shown in Fig. 2 to furnish a circumferential shoulder against which the gear 35 abuts. The lever 39 is mounted on the enlarged portion 41 of the shaft and carries a sector-shaped plate 42, and said plate 42 has at its ends the lips 43 and 44, respectively. A screw 45 passes through the lip 43 and its inner end is adapted to abut the stop pin 38, when the parts are in the position shown in Fig. 2. A link bar or rod 46 is loosely mounted on the lever arm 39 by a pivot 47, and connects with a throttle control lever (not shown) in the vehicle.

At the bottom of the case 2 is an annular flange 48, having an interior screw-thread, to which is secured an elbow 49. A flap valve 50 is mounted on a pivot 51, which is held in lugs 52.

The operation of my improved carbureter is as follows. The gasolene in the feed chamber 1 passes through the feed pipe 7 and rises in the bore of the nozzle 9 nearly to the top thereof, on the same level as in the feed chamber 1, said level being maintained by a float valve, or any other suitable means, such as is well known in this art, but not shown in the drawings. When the carbureter is not in operation, the air valve 23 is in

the position shown in Figs. 2 and 4. At this time the lever arm 39, link bar 46 and the connected parts are in the position shown in Figs. 1 and 2. When the air valve 23 is thus closed, the inner end of the needle valve 21 extends into and nearly closes transversely the bore of the nozzle 9, as illustrated in Figs. 4 and 6. This needle valve enters the nozzle bore at a point above the normal level of the gasolene therein. The chauffeur moves the throttle control lever and draws the link bar 46 in the direction indicated by the arrow 53, thereby operating the lever arm 39, which turns the throttle valve 31, fastened on the shaft 33, from the closed position shown in Figs. 2 and 3, to or toward the open position shown in Fig. 5, in the direction indicated by the arrow 54 in Fig. 5. This movement of the shaft 33 causes the gear 35, which is fastened on said shaft, to turn with it. This turning of the gear 35 communicates movement to the idler or intermediate gear 36, with which it meshes, and said movement of the gear 36 causes a movement of the gear 20. As these gears 35, 36 and 20 are of the same diameter and have the same number of teeth, they all revolve in equal times and to the same degree, and the gears 35 and 20 rotate in the same direction. The above described movement of the link bar 46 and lever arm 39 results in the turning of the air valve 23, as indicated by the arrow 55 in Fig. 5. The gear 20 is thus rotated to the same degree and extent that the gear 35 is. The gear 20 turns with it its own tubular shaft 19. The needle valve 21, which has been set in the tubular shaft to the desired adjusted position, is locked in such position by the check nut 29, and consequently rotates with the tubular shaft 19 and gear 20. As the air valve 23 is in loose engagement with the slot in the inner end of the tubular shaft 19, said valve turns in unison with said shaft and to the same degree. This movement of the gear 20, tubular shaft 19, needle valve 21 and air valve 23 cannot, however, exceed 90°, as illustrated in Fig. 5, where the vertical or open position of the air valve 23 is shown in solid lines and the horizontal or closed position of said valve is shown in dotted lines. The separate movement of the needle valve 21, which is caused by manipulating the handles 22, is for the purpose of adjustment, only, and determines the extent to which the inner end of the needle valve 21 extends into the bore of the nozzle 9. A quarter clockwise turn of the sleeve or bearing 19 of the gear 20 results in the unscrewing of the needle valve 21 to an extent not exceeding 90° and so the inner end of the needle valve 21 is slightly withdrawn and opens up a somewhat larger orifice in the bore of the nozzle 9, thus allowing a greater flow of the gasolene through it whenever the suction in the chamber 5 causes an overflow of the gasolene from the nozzle 9, as presently explained. Of course, the reverse movement of the link bar 46 and lever arm 39 results in a reverse movement of the air valve 23 and needle valve 21, so that the needle valve 21 again enters more fully into the bore of the nozzle and cuts off the flow of gasolene from the feed chamber 1 and pipe 7, as already described. In order to adjust the needle valve 21, however, it is necessary to loosen the check nut 29 slightly, and then the needle valve can be separately moved, either inwardly or outwardly, as may be needed, to get the proper adjustment of the needle valve, and then by screwing up the check nut 29, those parts are locked together, as before, for simultaneous operation, as already explained. It is thus seen that, whenever the air valve 23 is opened to any extent, the needle valve 21 is withdrawn to a proportionate extent from its closure of the nozzle bore, and vice versa, and at the same time the throttle valve 31 is turned to the same extent and in the same direction.

The flap valve 50, being permanently opened during the operation of the machine, allows air to pass from the external atmosphere to the air chamber 3. Therefore, in starting the carbureter to supply gasolene to the engine, the one throw of the lever arm 39 accomplishes the following results. The throttle valve 31 is opened to or toward the position shown in Fig. 5, and the piston of the engine cylinder begins to cause a suction in the chambers 5 and 3. The gasolene is sucked up out of the opening of the bore of the nozzle 9, and the air valve 23 is simultaneously opened. The gasolene is thus vaporized in the carbureting chamber 5 in the usual and well known manner, so that the air, passing through the carbureter, is heavily charged with gasolene vapor, which vapor is conducted to the engine cylinder for explosion. A reverse movement of the lever arm 39 closes to the same degree both the valves 31 and 23 and diminishes the discharge of the gasolene from the nozzle 9. The extent of the movements of the lever arm 39 is limited by the contact of the screw 45 with the stop pin 38 in one direction and with the contact of the lip 44 with the stop pin 38 in the opposite direction. The screw 45 is adjusted to any desired degree.

It is evident that the construction above specified and shown in the drawings allows a great range of different adjustments, and to provide these is one of the objects of this invention.

The relation of the gasolene discharge to the air admission is regulated by the adjusted position of the needle valve 21 in the tubular shaft 19 and boss 26 of the air valve 23. This adjustment is effected by loosening the

check nut 29, by manipulating it by means of its handles or spokes 30. Then the needle valve 21 may be moved farther into or out of the bore of the nozzle 9 to the extent desired, and is locked in said position by tightening up the check nut 29 again. In this way, the opening of the air valve 23 may be timed so that a certain desired quantity of air or degree of air movement may be provided before there is any discharge whatever of the gasolene from the nozzle 9 into the feed chamber 4; or it may be provided that the needle valve 21 shall stand open to a certain desired extent, as illustrated in Figs. 4 and 6, even while the air valve 23 is entirely closed. Any desired relation of the air supply and the gasolene supply to the feed chamber 4 can thus be established and maintained.

The aperture 24 in the disk of the air valve 23 allows the disk to assume the horizontal position seen in Figs. 2, 4 and 6, while the radial slot 25 therein allows the vertical position of the disk seen in Fig. 5. The relation of the throttle valve 31 to the air valve 23 can be regulated, adjusted and maintained by removing the idler or intermediate gear 36, and then turning by hand the gear 20, backward or forward, one tooth or more, and reëngaging the idler or intermediate gear 36 with the gears 35 and 20. In this way, the gear 23 can be set forward or backward, and so the timing of the operation of the valves 31 and 23 in relation to each other can be accurately adjusted and determined. If there is too much suction caused in the chamber 5 by the in-stroke of the piston of the engine, there is an excess of gasolene sucked out of the nozzle 9 and too little air supplied through the air valve 23 to properly or sufficiently vaporize said discharged gasolene, for which purpose I provide for an adjustment of the needle valve to regulate exactly the flow of the gasolene into the chamber 4 for any set position of the valves 23 and 31. In all these defective or unsatisfactory conditions, the adjustability just described of the gears 35, 36 and 20 in relation to each other and of the needle valve 21 remedies the difficulty and insures the proper proportion of air and gasolene either as to the quantity and quality of the mixture. In order to effect said adjustment of the gears 35, 36 and 20, the cap or cover 11 is made detachable, and when removed from position gives access to said train of gears. The flap valve 50, when closed, allows a small ingress of atmospheric air to the carbureter, through the openings 56 in said valve, but when the engine is operating, the valve 50 is lowered to open the outer end of the elbow 49 to the full extent for the admission of air, and the air current flowing into the chambers 4 and 5 is regulated by means of the air valve 23, as described. By providing the arm 39 with a plurality of holes for the insertion of the screw or bolt 47, the leverage on said arm by the action of the rod or link bar 46 can be adjusted. It is evident that instead of using a train of gears to operate the valves 23 and 31 simultaneoulsy I may use levers and link bars, or other mechanical equivalents.

I claim as a novel and useful invention and desire to secure by Letters Patent:—

1. In a carbureter, the combination of a case, an air valve having two diametrically opposite tapped bosses and also a central aperture and a radial slot extending from said aperture, a gasolene feed pipe, a nozzle extending vertically from and opening at its base into said pipe, which nozzle extends up through said aperture and slot of the air valve, a pivot passing through the case and entering the air valve in one of the tapped bosses thereof, a needle valve passing through the case and through the other of the tapped bosses of the air valve and into the nozzle bore at a right angle thereto so as to be capable of opening or closing the nozzle bore, and a handle on the outer end of the needle valve.

2. In a carbureter, the combination of a case, an air valve pivotally mounted in the case and having a radially directed slot, a gasolene feed pipe, a nozzle extending from the pipe through the slot of the air valve, and a needle valve passing through the air valve in a radial direction and entering through the nozzle at a right angle thereto into the nozzle bore substantially as and for the purpose specified.

3. In a carbureter, the combination of a tubular case, a circular air valve adapted to fit in said case and provided with a central aperture and a radial slot, two diametrically arranged bosses one having a smooth bore tapped therein and one having a screw-threaded bore tapped therethrough, a gasolene feed pipe, a nozzle extending from the pipe up through the radial slot of the air valve and having a radial bore through one side opening into the nozzle bore, a needle valve having a screw-threaded shank passing through the last named boss of the air valve and having its inner end supported in the radial bore of the nozzle wherein the needle valve is longitudinally movable to open or close the nozzle bore a gear having a tubular shaft which is screw-threaded on its outer and inner surfaces, by which shaft extending through the case said gear is mounted, a handle on the outer end of the needle valve, and means for rotating said gear, said threaded shank of the needle valve being engaged with and movable in the bore of the tubular shaft of the gear.

4. In a carbureter, the combination of a tubular case, a circular air valve adapted to fit in said case and provided with a central aperture and a radial slot, two diametrically arranged bosses having bores tapped

therein, a gasolene feed pipe, a nozzle extending from the pipe up through the radial slot of the air valve and having a radial bore through one side opening into the nozzle bore, a needle valve having a screw-threaded shank passing through the last named boss of the air valve and having its inner end supported in the radial bore of the nozzle wherein the needle valve is longitudinally movable to open or close the nozzle bore, a gear having a tubular shaft which is screw-threaded on its outer and inner surfaces, by which shaft extending through the case said gear is mounted, means for rotating said gear, a handle on the outer end of the needle valve, and a check nut mounted on the screw-threaded shank of the needle valve and adapted to hold the needle valve in an adjusted position.

5. In a carbureter, the combination of a case, an air valve mounted rotatably in the case, diametrically arranged pivots on which the air valve is rotatable, one of said pivots having a central longitudinal screw-threaded bore, a screw-threaded needle valve extending through the case at one side and passing through the said tubular pivot, a gasolene discharging nozzle having a radial bore into which the inner end of the needle valve extends, and means for rotating the air valve and needle valve simultaneously and to the same degree.

6. In a carbureter, the combination of a case, an air valve mounted rotatably in the case, diametrically arranged pivots on which the air valve is rotatable, one of said pivots having a central longitudinal bore, a needle valve extending through the case at one side and passing through the tubular pivot, a gasolene nozzle having a bore entering sidewise into the bore of the nozzle and in which the inner end of the needle valve extends movably, means for regulating the extent to which the needle valve enters the nozzle bore, and means for rotating the needle valve and air valve simultaneously to the same degree.

7. In a carbureter, the combination of a tubular case, a rotatable tube mounted in said case and having an exterior and an interior screw thread and a central longitudinal slot or bifurcation at its inner end, a valve disk rotatable in said case and extending loosely at one portion of its edge into said slot or bifurcation of the tube, a pivot extending loosely into a socket in the edge of the valve disk diametrically opposite to said engaging tube, means for rotating said tube, a gasolene feed device comprising a nozzle, and a needle valve mounted in said tube and entering said nozzle.

8. In a new article of manufacture, a combined air valve and needle valve for carbureters, consisting of a circular disk having a central radial aperture and two diametrically opposite bosses with bores therein, a tube having a screw-threaded bore and adapted to engage with the valve disk at one end of said tube, a needle valve having a screw-threaded shank engageable with the bore of said tube and having its inner end extending through one of the bosses of the valve disk to serve as a pivot and also projecting into the central aperture of the valve disk, a handle on the outer end of the needle valve, and means for rotating the tube, air valve and needle valve in unison.

9. In a carbureter, in combination, a throttle valve means for mechanically diminishing the transverse area of the air supply passage at the gasolene orifice automatically and positively, as the throttle valve is closed; means for changing the area of the air supply passage at the gasolene orifice at any given position of the throttle valve; means for mechanically diminishing the flow of gasolene automatically and positively as the throttle valve is closed; and means for changing the flow of gasolene at any given position of the throttle valve.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT HOWARTH.

Witnesses:
WILLIAM E. PREW,
HOWARD A. LAMPREY.