W. H. OGDEN.

CARBURETER.

APPLICATION FILED AUG. 3, 1917.

1,285,339.

Patented Nov. 19, 1918.

3 SHEETS—SHEET 1.

Fig. 1.

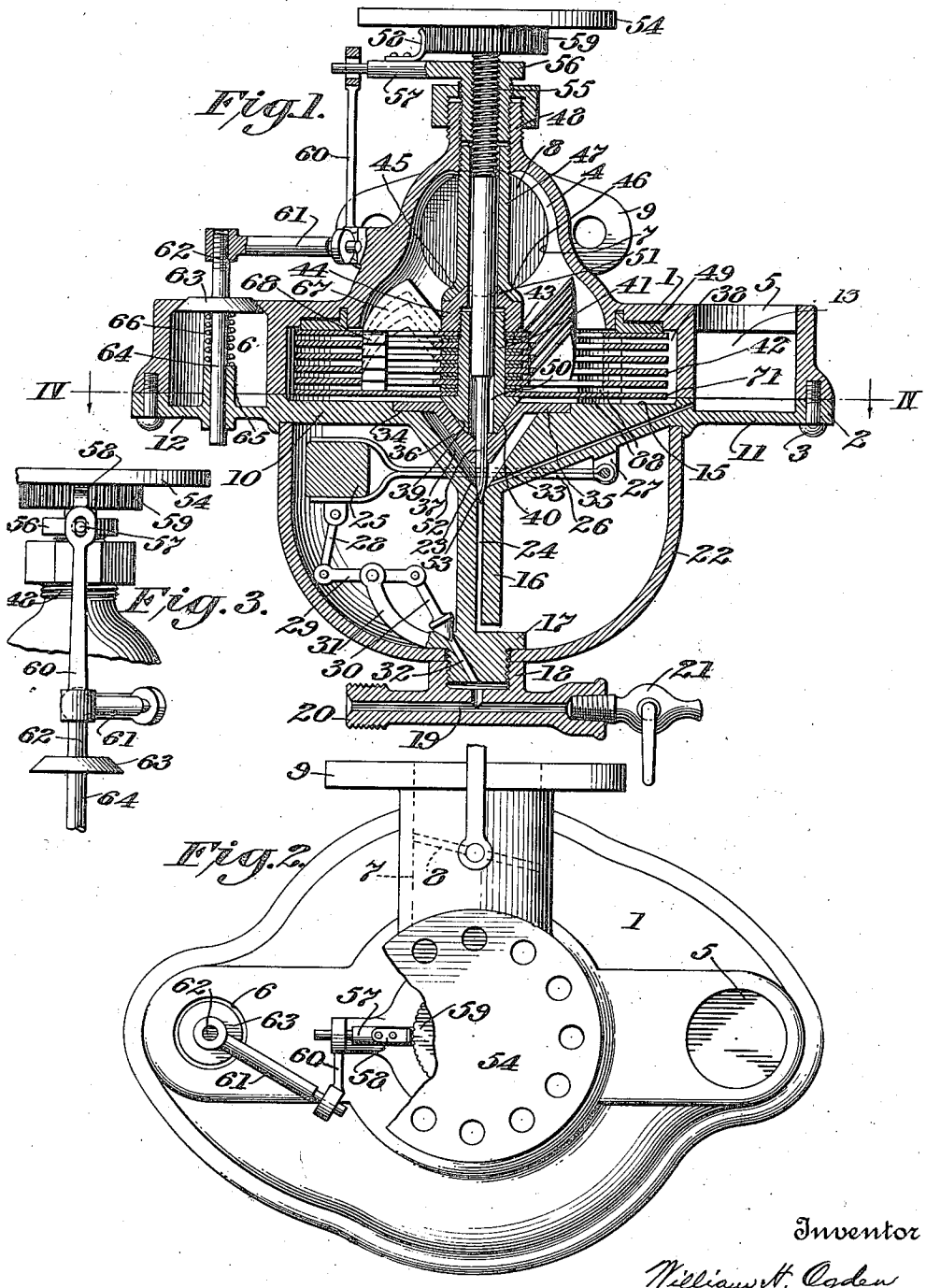


Fig. 3.

Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 4.

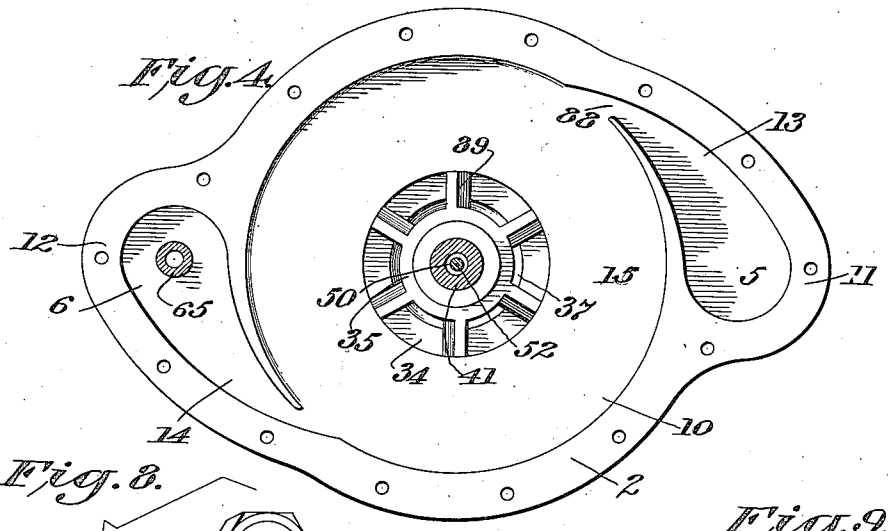


Fig. 8.

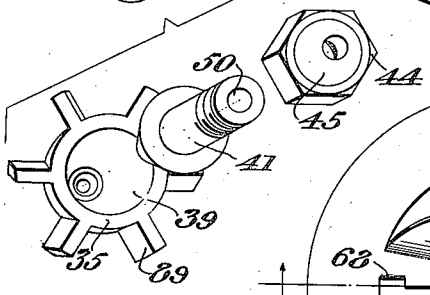


Fig. 5.

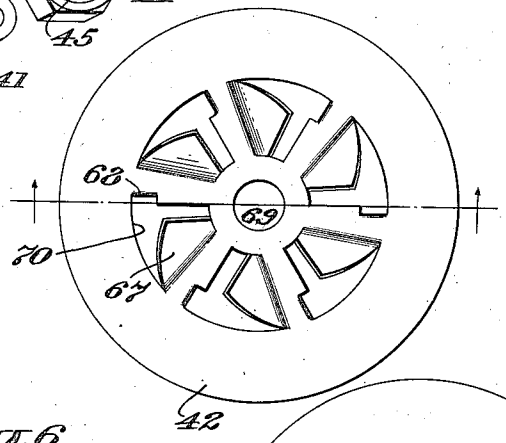


Fig. 9.

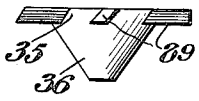


Fig. 6.

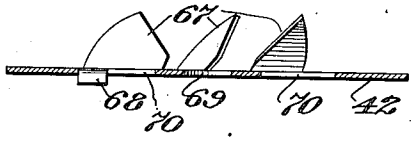
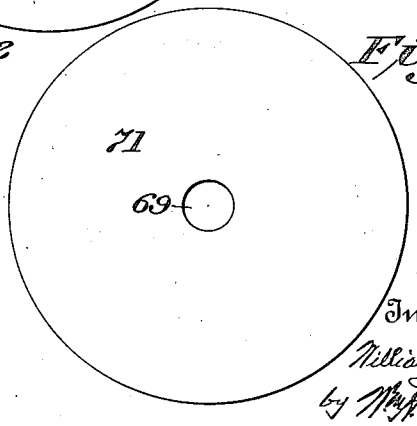


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 10.

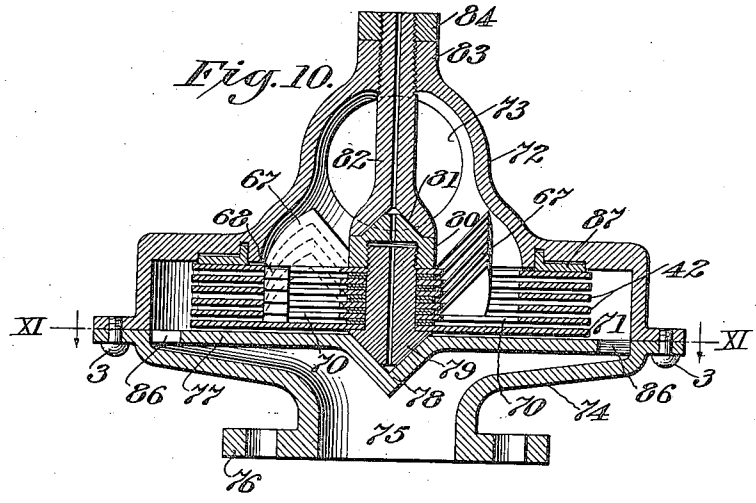
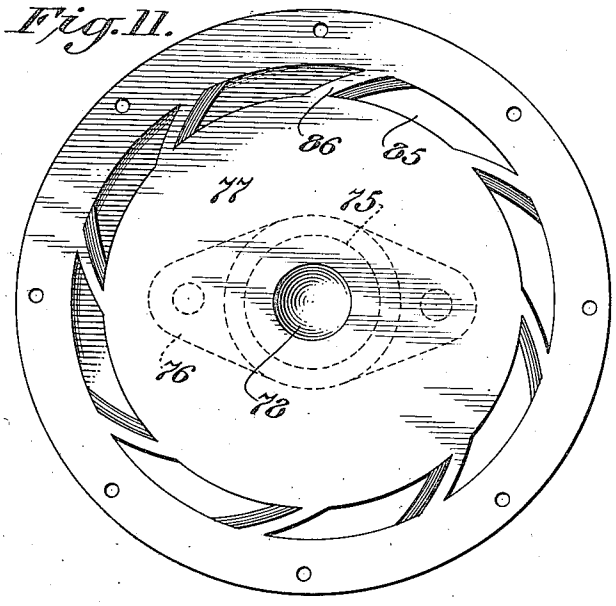


Fig. 11.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,285,339. Specification of Letters Patent. Patented Nov. 19, 1918.

Application filed August 3, 1917. Serial No. 184,313.

To all whom it may concern:

Be it known that I, WILLIAM H. OGDEN, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented a certain new and useful Improvement in Carbureters, of which the following is a full, clear, and exact description.

In the use of carbureters with internal combustion engines, especially engines of the high-speed, multi-cylinder type there is always more or less condensation of gasolene in the combustion chambers of the cylinders and in the intake manifold due to imperfect mixture of the gasolene with air; loss of power at high speeds and at low speeds under heavy load due to improper mixture and a consumption of gasolene all out of proportion to the power developed, and in the case of engines used in automobiles and other vehicles to the distance traveled. I have found that by constructing a carbureter in accordance with my invention hereinafter explained, the faults above mentioned are practically eliminated.

The object of this invention is to provide a carbureter which will insure the complete vaporization of the gasolene and afford a perfect mixture at all engine speeds and under varying loads, thus eliminating waste of fuel and insuring at all times maximum efficiency of the engine with which it is used, with a minimum consumption of gasolene.

Although the carbureter of this invention is designed primarily for use with gasolene, it has been found to give very satisfactory results with the heavier hydrocarbons, such as kerosene.

My invention contemplates the arrest in the carbureter itself of the fuel which has not entered into a homogeneous mixture with air by virtue of the physical phenomena of capillary attraction, viscosity, cohesion and adhesion, in such way that the thus detained liquid may be subsequently subjected to mixture with air and be utilized for supply to the engine in efficient form, without liability of its entering the intake or the engine cylinders in liquid form, as I will proceed now to explain and finally claim.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a vertical substantially central section of a carbureter embodying my invention. Fig. 2 is a top plan view with a portion of the hand wheel of the needle valve broken away to show the automatic adjusting device. Fig. 3 is a partial elevation looking toward the right of Fig. 1, showing the automatic adjusting device. Fig. 4 is a view of the lower portion of the carbureter taken on line IV—IV of Fig. 1. Fig. 5 is a top plan view of one of the revolving disks, and Fig. 6 is a transverse section of the same. Fig. 7 is a plan view of the imperforate lowermost disk of the rotor. Fig. 8 is a perspective view of the disk spindle and nut and bearing spider. Fig. 9 is a side elevation of the bearing spider. Fig. 10 is a vertical substantially central section showing a modification embodying the invention in an accessory applicable to carbureters of ordinary construction. Fig. 11 is a plan view of the lower portion of the device of Fig. 10 taken on line XI—XI thereof.

Referring to Figs. 1 to 8, inclusive, the carbureter has a body portion formed preferably of two parts 1 and 2, suitably secured together by screws 3 or bolts and nuts. The upper part 1 has a chamber 4 and main and auxiliary air inlets 5 and 6, respectively, and the outlet 7 provided with the usual butterfly or other throttle-valve 8 and the flange coupling 9 for connecting the carbureter with the intake manifold of an engine. The lower part 2 has a bed 10 with lateral extensions 11 and 12 which form bottoms for the main and auxiliary air inlets 5 and 6, respectively, and have circumferentially arranged channels which in conjunction with similar complementary channels in the part 1 form passages 13 and 14 respectively communicating with the sunken portion 15 of the bed 10 for the admission of air to the mixing chamber tangentially for a purpose hereinafter explained.

Arranged centrally of and depending from the bed 10 is a column 16 having its lower end formed with a shoulder 17 and screw threaded to receive a coupling mem-

ber 18 provided with a gasolene duct 19, pipe attaching nipple 20, and a drain cock 21. This coupling member is adapted to hold in place a float chamber 22 of pressed metal or of any other usual or approved construction.

The column 16 is enlarged at its upper portion to form a gasolene chamber 23 wherein the gasolene which enters through the inlet 24 is maintained normally at a constant level by means of a float 25 supported by an arm 26 which is pivotally connected to an ear 27 on the under side of the bed 10, and this float is connected by a suitable link 28 and lever 29 to a valve 30 supported by the lever 29 which is pivoted on an extension or arm 31 formed on the shoulder 17, and this valve 30 is operated by the float to open and close the gasolene port 32. In place of the valve and float arrangement here shown, any other approved form may be used which will perform the proper functions.

An air passage 33 extends from the main air inlet to the gasolene chamber 23 and opens into said chamber at a point below the level of the gasolene therein.

The bed 10 is formed on its upper face with a recess 34 concentric with the gasolene chamber 23 and adapted to receive a bearing spider 35 and hold it in axial alinement with the gasolene inlet 24. This spider has a downwardly projecting extension 36 which conforms to the shape of the gasolene chamber 23 and extends into it thereby forming an annular passage 37 through which the gasolene must pass in reaching the mixing chamber 38 of the carbureter. The upper face of the spider 35 is formed with an inverted conical step 39 to receive the lower similarly shaped bearing end 40 of a spindle 41 upon which is mounted a rotor formed of a series or nest or any suitable number, preferably a plurality of disks 42 spaced apart by any suitable spacing devices such as washers 43 and supported by and turning with the spindle. The upper end of the spindle 41 is screw threaded to receive a clamping nut 44 which holds the disks in proper relation to each other and to the spindle, and the upper face of this nut is provided with a conical bearing face 45 which fits a similarly formed bearing 46 in the end of a sleeve 47 having its upper end threaded into a neck 48 formed on or applied to the part 1 of the body portion of the carbureter. By adjustment of this sleeve 47 toward or away from the nut 44 the spindle and its assembled disks may be made to run in a tight or loose bearing, as desired. A bushing and bearing ring 49 is seated in the upper part 1 and is so arranged as to partially float in its seat so as to insure the proper and true revolution of the disks and to cause all mixture to pass out of the chamber 38 through openings between the vanes of the disks hereinafter described.

Extending through the sleeve 47 and through a central bore 50 of the spindle is a needle valve 51, the lower reduced end 52 of which fits snugly in a bearing formed in the extension 36 of the spider 35 so that no gasolene may ascend through the center of the spindle. The tapered end 53 of the needle valve seats in the gasolene inlet 24 and may be adjusted to increase or diminish the supply by means of a hand wheel 54 at the upper end of the valve. The adjusting screw portion 55 of the needle valve is threaded into a sleeve 56 internally screwthreaded to receive it and screwthreaded externally to coact with a complemental thread in the neck 48. This sleeve has a laterally extending operating arm 57 provided with a finger 58 which engages the notches on a wheel 59 fixed on the upper end of the stem of the needle valve, and this arm is connected by a bell-crank lever 60 with an arm 61 adjustably mounted on an extension 62 of a puppet valve 63 arranged in the auxiliary air intake 6, so that in case of high speed or heavy load of the engine and consequent increased suction, the auxiliary air inlet valve 63 will, through the arm 61, lever 60, arm 57, finger 58 and wheel 59, turn the needle valve to increase the gasolene supply. The valve 63 may be of ordinary construction, and is here so shown, having a stem 64 slidably mounted in a bearing 65 and backed up and held normally closed by a spring 66. Referring particularly to Figs. 5 and 6, the disks 42 are preferably circular and formed by stamping or otherwise, with centrally arranged vanes 67 bent up at an angle from the plane of the disk and with stops 68 bent downwardly, for the purpose when the disks are nested with the spacers 43 between them, of preventing the vanes from contacting with each other. Thus it will be seen that when the disks are nested or arranged in a series, one above another, there will be a space between each disk and that one next adjacent to it, caused by the spacers 43, and there will also be a corresponding space between the upper and lower faces of the vanes of superposed disks caused by the stops 68. Each disk has a center opening 69 for the purpose of mounting it upon the spindle 41. The formation of the vanes 67 from the metal of the disk leaves a series of openings 70 through which the vanes of disks below it may project. As many of these disks may be used as the requirements of the size of engine and corresponding size of carbureter demand.

The lowermost disk 71 of the rotor or nest of disks, as shown in Fig. 7, differs from the others in that it is imperforate and

has no vanes and forms a seal over the bottom of the rotor, thereby causing all mixture and gasolene to pass under the rotor to the chamber 38 and thence enter the rotor between the disks at their peripheries.

Referring to Figs. 10 and 11, wherein a modification of the invention is shown by which it is adapted for use with known carbureters, only such parts of the device of the invention are used as are necessary to incorporate its principle. That is, the attachment is so made as to permit of the installation in known carbureters of the principle of the rotor formed of disks. To this end, there is a two-part body portion having an upper part 72 provided with an outlet 73 having the usual butterfly or other throttle valve and coupling flange (not shown), and a lower part 74 provided with an inlet 75 and coupling flange 76 for attachment to the flange of a carbureter, so as to conduct hydrocarbon mixture from the carbureter to the device of the invention. The part 74 has a bed portion 77 provided with a centrally arranged step 78 to receive a spindle 79 upon which the disks 42 are mounted and held in position thereon by a nut 80, these three last mentioned parts being similar to those already described. The bearing face 81 of the nut 80 seats in an adjustable bearing post 82 threaded into a neck 83, its adjusted position being maintained by means of a lock nut 84. The bed portion 77 is provided with a series of circumferentially arranged openings 85 so formed as to admit mixture from the attached carbureter with a whirling motion and tangentially to the disks, and the spacers 86 may be beveled, if desired, to offer as little resistance as possible to the upwardly flowing mixture. A packing and bearing ring 87 is provided, as in the case of the carbureter before described, to assure the easy and true revolution of the rotor and to prevent escape of mixture into the outlet by its passing around and over the rotor, thereby insuring the escape of all mixture through the spaces between the vanes of the disks.

The main principle of the invention being embodied in both forms of the device shown and described, a description of the operation of one form will suffice for both.

Referring to Figs. 1 to 9, inclusive, gasolene or other liquid fuel is supplied at 20 and through duct 19 and port 32 enters the float chamber 22 and rises to a predetermined height therein and in the chamber 23 which it enters through inlet 24. This height of the gasolene, or gasolene level as it is called, is kept constant by means of the float 25, in the usual manner, and as described.

The suction in the carbureter caused by the engine to which it is attached, draws air in through air inlet 5 and passage 13 and this air enters the chamber 38 tangentially owing to the circumferential arrangement of the passage 13, and moreover, it enters in a small current and with considerable force due to the constricted area of the opening 88 of passage 13 and forms a whirling current within the chamber 38. This current of air, in order to reach the outlet 7, must pass between the disks 42 and their vanes 67, and in so passing it imparts a rapid rotary motion to the rotor or nest of disks.

In addition to the current of air just described, an additional small jet of air is sucked in through the inlet 33 and is introduced below the level of the gasolene in chamber 23, thereby forcing the gasolene out of chamber 23 through annular passage 37 into chamber 38, where it is sucked into the nest of disks. When the gasolene in this partially atomized form is brought in contact with the surfaces of the disks, any portion of the liquid not homogeneously mixed with air but merely held in suspension is deposited on the disks, and the capillary attraction caused by adherence to the superposed adjacent faces of the disks and the cohesion present in the particles of the gasolene causes them to be arrested between the disks and form a thin film therebetween. The rapidly revolving disks will, by their centrifugal action, discharge a certain quantity of the accumulation of liquid gasolene from between them and into chamber 38, where it will be again picked up by the whirling current of air and re-introduced between the disks. These three forces, suction, capillary attraction and centrifugal force, together with a certain amount of viscosity present in the gasolene itself, make it impossible for much, if any, gasolene in liquid form to pass between the disks and their vanes with the outrushing current of air. It will, therefore, be evident that what gasolene passes between the disks and between their vanes 67 to the outlet 7 must be very finely atomized and so mixed with air as to form a completely combustible mixture. The exhaust from an engine with which this carbureter was used was colorless and odorless, which fact would tend to the belief that the vapor furnished by the carbureter to the engine contained no free gasolene and was completely combustible. This is also evidenced by lessened gasolene consumption.

Under conditions of high engine speed or heavy load the auxiliary air valves 63 will come into operation, thus admitting additional air through passage 14 in a whirling current as in the case of that admitted through the main air inlet 5.

The rapidity with which the gasolene may enter the chamber 23 is regulated by means of the needle valve 51.

The connection between the auxiliary air valve 63 and the needle valve 51 provides for increasing the supply of gasolene to compensate for the additional supply of air admitted through the auxiliary air inlet 6, but the needle valve 51 may be adjusted independently of this automatic connection as will be evident from the construction shown, and if desired, the automatic adjusting device may be omitted.

The supporting arms 89 of the bearing spider 35 may be beveled, as shown most clearly in Figs. 8 and 9, to offer the least possible resistance to the upwardly flowing whirling gasolene.

Various changes in details of construction and arrangement of parts are within the spirit of the invention and the scope of the appended claims.

What I claim is:—

1. In a carbureter, means for mixing air with a liquid hydrocarbon, and a discous rotor to the action of which said mixture is subjected in the presence of a current of air, the disks of said rotor arranged in close proximity so as to cause the adherence to and between them of any hydrocarbon suspended in the mixture in liquid particles, and the revolution of said rotor serving to discharge said adhering liquid hydrocarbon by centrifugal force whereby it may be again subjected to the action of the rotor and current of air.

2. In a carbureter, means for mixing air with a liquid hydrocarbon, and a rotor of closely spaced-apart nested disks to the action of which said mixture is subjected in the presence of a centripetally flowing current of air, whereby any hydrocarbon carried between said disks in liquid form will be arrested by adhesion thereto, the centrifugal action of said rotor causing such adhering hydrocarbon to be discharged from said rotor and thereby subjected to further action by said rotor when again introduced thereinto by said current of air, substantially as described.

3. In a carbureter, a mixing chamber having an inlet for liquid hydrocarbon and an outlet for combustible mixture and coincidentally revoluble disks in said chamber which by capillary attraction due to the proximity of their adjacent faces will arrest excess hydrocarbon suspended in the mixture in liquid form and by centrifugal force return it to said mixing chamber.

4. In a carbureter, a mixing chamber provided with an inlet for liquid hydrocarbon and an outlet for combustible mixture, and a revoluble nest of disks in said chamber interposed between said inlet and outlet for arresting excess hydrocarbon suspended in the mixture in liquid form.

5. In a carbureter, a mixing chamber having an inlet for liquid hydrocarbon and an outlet for combustible mixture, and a nest of disks revolubly mounted in said chamber and provided with overlapping vanes between which the mixture must pass in its passage to the outlet and by which a rotary motion is imparted to said disks under the influence of the outrushing mixture, said disks and their vanes being spaced apart from the next adjacent disks and their vanes respectively so as to form passageways for the mixture and arrest therein excess hydrocarbon suspended in the mixture in liquid form.

6. In a carbureter, a mixing chamber having an inlet for liquid hydrocarbon and an outlet for combustible mixture, a nest of disks revolubly mounted in said chamber and interposed between said inlet and outlet in such manner as to intercept all mixture passing therebetween and arrest excess hydrocarbon suspended in said mixture in liquid form and return it to said mixing chamber, and main and auxiliary air inlets communicating with said mixing chamber in such manner as to admit air thereto tangentially to said disks whereby air is introduced to said disks at their peripheries.

7. A carbureter, having a mixing chamber provided with an inlet for liquid hydrocarbon and an outlet for combustible mixture, an air inlet connected with said hydrocarbon inlet, a plurality of disks provided with vanes revolubly mounted in said mixing chamber and interposed between said inlet and outlet and through and between which all mixture must pass in reaching said outlet and in passing deposit therebetween excess hydrocarbon suspended in it in liquid form, a valve for regulating the flow of liquid hydrocarbon at said inlet, a main air inlet and an auxiliary air inlet communicating with said mixing chamber, a valve in said auxiliary air inlet, and connections between said last mentioned and first mentioned valves whereby when the auxiliary air inlet valve opens the flow of hydrocarbon to said mixing chamber will be increased.

8. In a carbureter having a two-part body portion and a float chamber, a mixing chamber having an inlet for liquid hydrocarbon and an outlet for combustible mixture, main and auxiliary air inlets communicating with said mixing chamber, communication between said hydrocarbon inlet and said float chamber, a float in said float chamber for regulating the level of liquid hydrocarbon in said hydrocarbon inlet, an air inlet emerging in said hydrocarbon inlet below said level and communicating with said main air inlet, a valve for regulating the size of the opening affording communication between said hydrocarbon inlet and said float chamber, and a plurality of superposed nested circular disks revolubly mounted in said mixing chamber and through and be-

tween which all mixture must pass in reaching said outlet for separating from the hydrocarbon mixture excess hydrocarbon suspended therein in liquid form and returning same to said mixing chamber by centrifugal force for further action by said disks.

9. A carbureter, provided with a mixing chamber having a fuel inlet and an outlet for combustible mixture and air inlets communicating tangentially with said chamber, a rotor mounted in said chamber and adapted to receive mixture peripherally and discharge same centrally, said rotor being interposed between said fuel inlet and mixture outlet, and means in said chamber coöperating with said rotor whereby all mixture must pass through said rotor in reaching said outlet, for the purpose specified.

10. A carbureter, provided with a mixing chamber having a fuel inlet and an outlet for carbureted air and air inlets communicating with said chamber, a rotor mounted in said chamber and adapted to receive carbureted air peripherally and discharge same centrally, said rotor being interposed between said fuel inlet and said outlet, and a bearing and bushing ring mounted in said chamber and coöperating with the upper face of said rotor whereby all carbureted air must pass through said rotor in reaching said outlet, for the purpose specified.

11. In a carbureter, a mixing chamber having a fuel inlet and an outlet for combustible mixture, a rotor mounted therein and interposed between said inlet and outlet, said rotor formed of a nest of spaced apart disks and provided with substantially centrally arranged openings through which the mixture is discharged, an imperforate disk forming a bottom plate for said rotor, and a ring seated in said chamber and cooperating with the uppermost disk of said rotor whereby in conjunction with said imperforate disk all mixture must enter said rotor peripherally and be discharged centrally, for the purpose specified.

12. In a carbureter, a mixing chamber, a rotor mounted therein composed of superposed disks so spaced apart as to cause capillary attraction and arrest liquids attempting to pass therebetween, and bearings in said chamber for supporting said rotor revolubly therein.

13. In a carbureter, a mixing chamber provided with a bed, a rotor provided with a spindle, a fuel inlet in said bed below said rotor, a spider supported in the bed above said inlet and having a step bearing for said spindle, and a post in said chamber above said rotor and forming a bearing for the other end of said spindle.

In testimony whereof I have hereunto set my hand this first day of August, A. D. 1917.

WILLIAM H. OGDEN.

Witnesses:
REBECCA COHN,
CHRISTINE DOWNES.