No. 865,539. PATENTED SEPT. 10, 1907.

A. C. STEWART.

CARBURETER.

APPLICATION FILED FEB. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 3

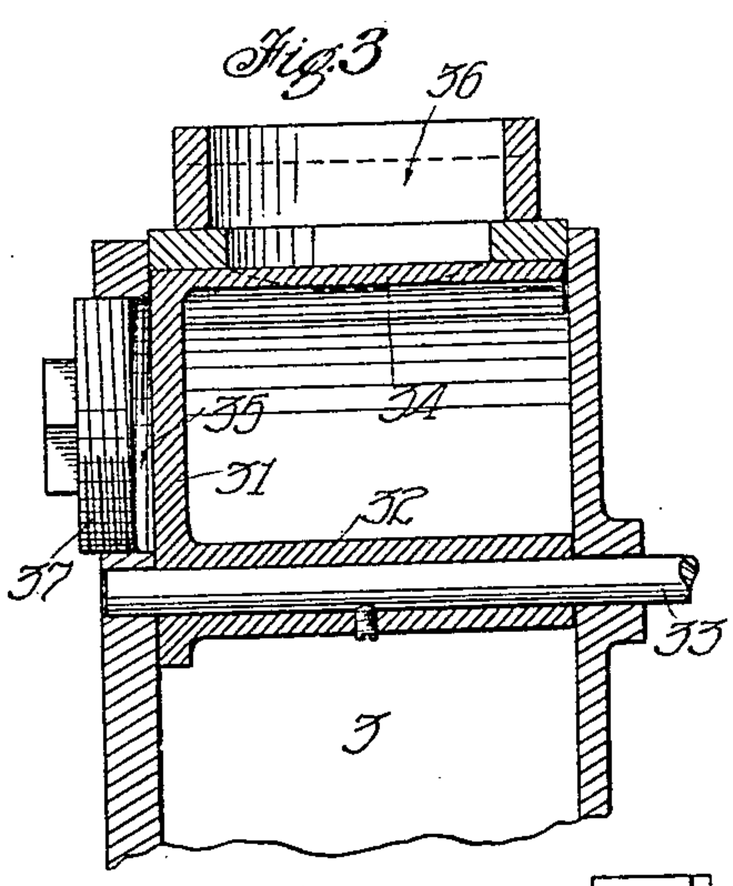

Fig. 1

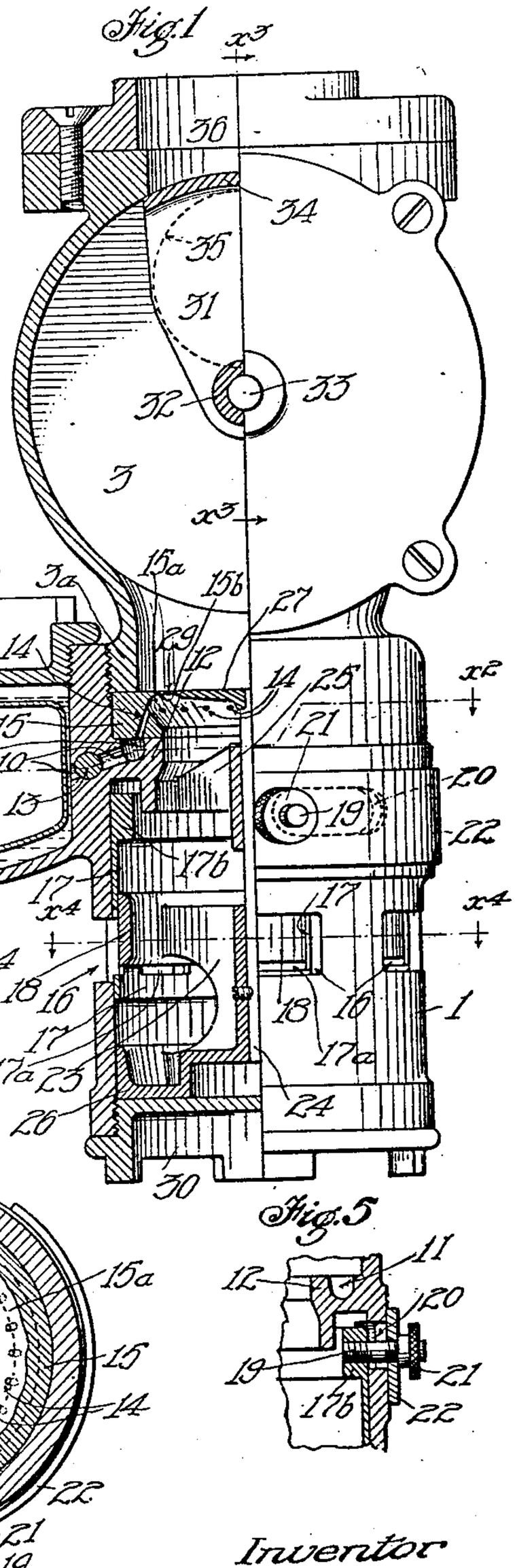

Fig. 4

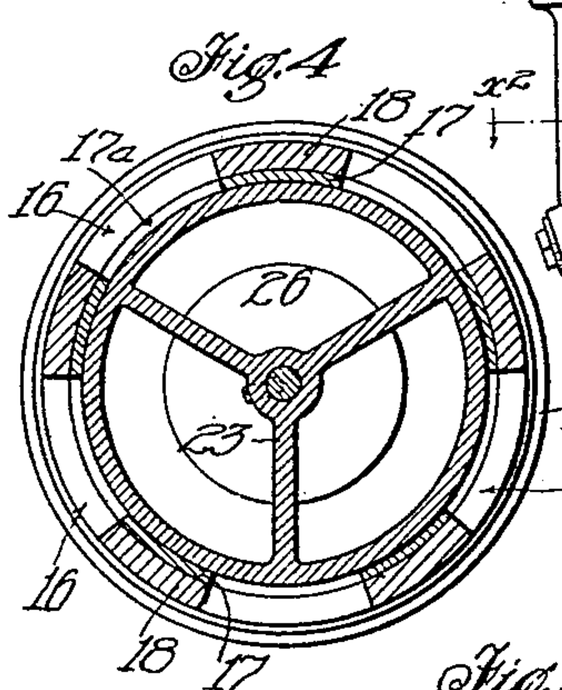

Fig. 2

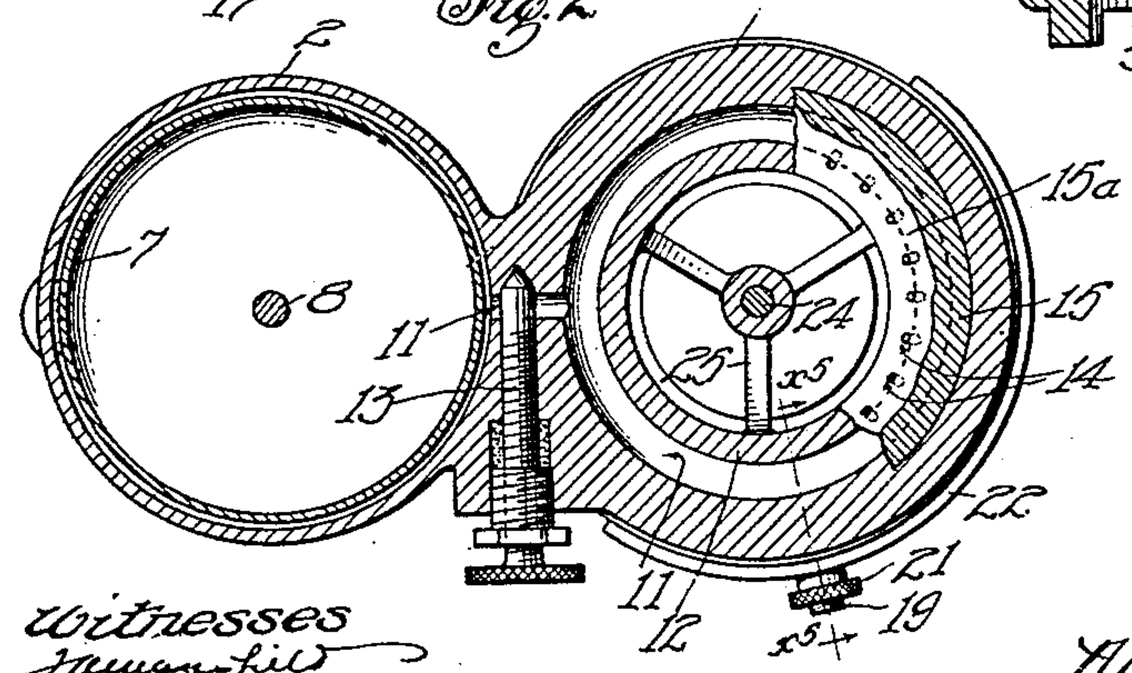

Fig. 5

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No. 865,539.

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2 SHEETS—SHEET 2.

Fig. 7

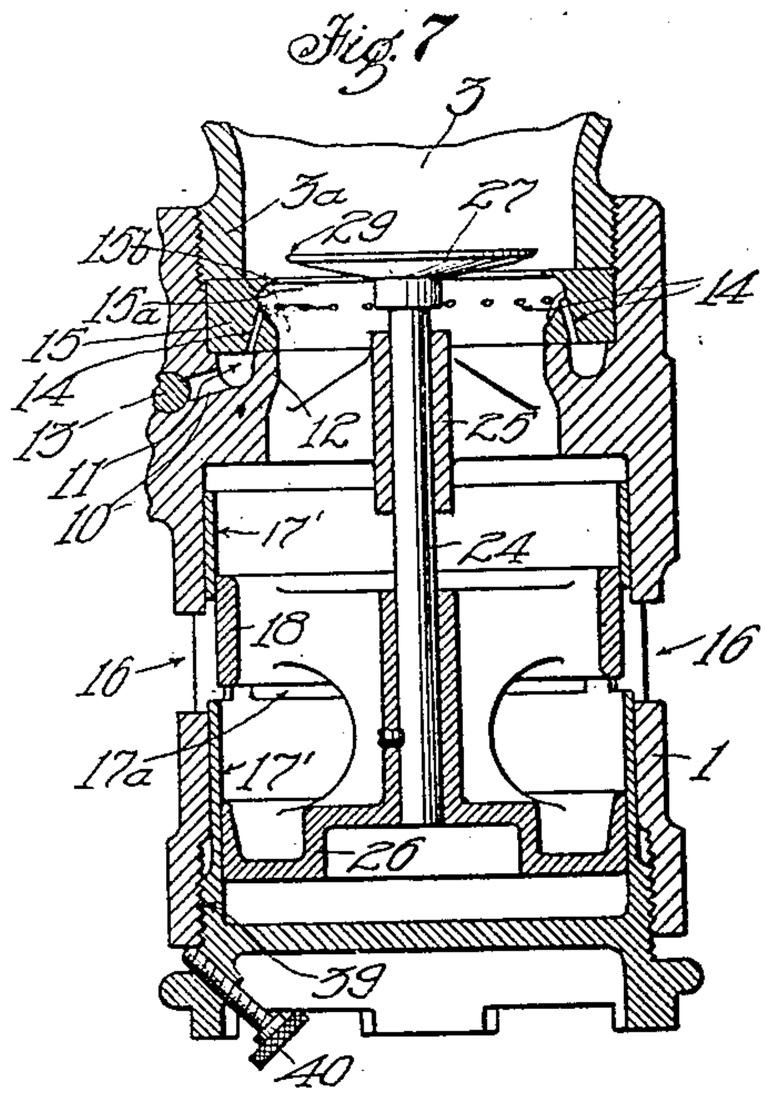


Fig. 6

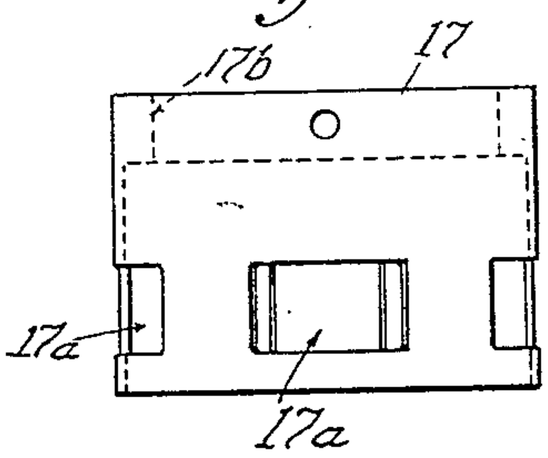


Fig. 8

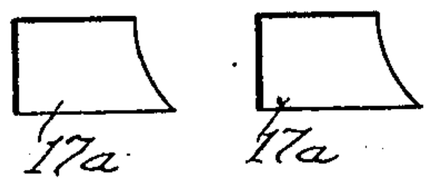
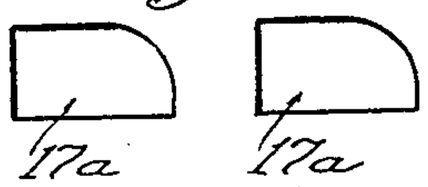


Fig. 9.



Witnesses
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UNITED STATES PATENT OFFICE.

ALFRED C. STEWART, OF LOS ANGELES, CALIFORNIA.

CARBURETER.

No. 865,539. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed February 6, 1905. Serial No. 244,337.

To all whom it may concern:

Be it known that I, ALFRED C. STEWART, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Carbureters, of which the following is a specification.

The main object of this invention is to provide a carbureter for internal combustion engines that will produce a mixture of substantially uniform or constant quality of richness under different conditions of working; for example, at different speeds.

A further object of the invention is to provide for uniform or thorough distribution of the combustible and the air throughout the mixture.

Another object of the invention is to do away with the excessive chilling of the carbureter connections that sometimes occurs, and also dispense with the use of special warming devices.

Carbureters now in general use supply the oil or fluid fuel to an outlet from which it is drawn by the injector or entraining effect of a current of air passing said outlet on its way to the admission port of the engine. It is necessary to have the oil supplied at a level a little below the outlet so that it will not flow except when drawn out by the suction of the air, but in order to supply sufficient oil when the engine is just starting, this difference of level must be very slight. The amount of oil drawn from the outlet by the air increases with the velocity of the air and therefore with the speed of the engine, and if the oil supply is at the right level for low speed the increase of flow at high speeds will furnish an over-supply of oil. An attempt has been made to correct this by a by-pass inlet valve opening against the pressure of a spring to allow air to flow to and dilute the mixture without passing the oil outlet, but the correction thereby obtained is imperfect. Such carbureters also introduce the oil in an uneven or undistributed manner, as the oil does not have time to become diffused or distributed throughout the mixture, but is thrown or drawn in drops of greater or less size either directly into the explosion chamber or against any bend or wall that may lie in its course. In the latter case, part will evaporate into the air passing over it, but this will produce an undesirable chilling of the parts. If heat be applied to the mixture to expedite the diffusion and overcome the chilling effect, the efficiency of the engine is lowered.

In the present invention, the entraining of the oil by the motion of the air thereover is dispensed with as being unreliable in its operation, and a system is substituted of supplying oil under definite, direct suctional action, the effect of which can be graduated to produce substantially uniform conditions of mixture under varying conditions of engine speed.

The invention also provides means for applying to the oil, after it has passed from the outlet, a current of air of definite velocity concentrated on the oil in such manner as to produce thorough atomization or spraying thereof and diffusion of the oil throughout the mixture.

The accompanying drawings illustrate the invention, and referring thereto:—Figure 1 is a side elevation partly in section. Fig. 2 is a section on line x^2—x^2 in Fig. 1. Fig. 3 is a section on line x^3—x^3 in Fig. 1. Fig. 4 is a section on line x^4—x^4 in Fig. 1. Fig. 5 is a section on line x^5—x^5 in Fig. 2. Fig. 6 is an elevation of a regulating sleeve for the air inlet. Fig. 7 is a sectional elevation of part of the carbureter having a different form of the regulating sleeve. Figs. 8 and 9 are developments showing different forms of the air inlet ports.

1 designates the tubular body of the carbureter which has the float chamber 2 formed on or connected to the side thereof. A chamber or member 3 may be connected to the member 1 and may serve as a combined throttle valve and mixing chamber. The float chamber 2 has an oil inlet 4 at the bottom connected to the oil supply pipe 5, the passage of oil from this inlet to the float chamber being controlled by a valve 6 operated by the float 7 in the usual manner, said float having a stem 8 working in a guide 9 at the top of the float chamber.

A passage or duct 10 leads from the float chamber 2 through the wall of the tubular member 1 into an annular chamber or recess 11 formed in said wall or in a flange 12 on the inner side thereof, communication through duct 10 being controlled by a valve 13. The annular chamber or recess 11 communicates with the interior of the tubular member 1 through a series of orifices 14 extending preferably upwardly and inwardly from said chamber. Said orifices may be formed in a ring 15 that is secured within the tubular member 1 and on top of the flange 12, being held in position, for example, by the screw-threaded lower end 3^a of member 3 screwing into the member 1 and bearing down on the ring 15.

The tubular member 1 is provided, below the oil communications, above described, with a series of air inlets or openings 16 in its wall, the communication through these openings from the outer air to the interior of the tubular member 1 being controlled by a regulating sleeve 17 and a sliding valve-ring 18. Regulating-sleeve 17 slides within tubular member 1 and has a series of ports or openings 17^a corresponding to the ports or openings 16 in the tubular member 1, and the valve ring 18 slides within the sleeve 17 and constricts or closes or opens communication through the aforesaid ports, as hereinafter described. Regulating-ring 17 is movable or adjustable both circumferentially or rotatably and vertically or longitudinally of the tubular member 1, and means are provided for fastening the said regulating sleeve when it has been brought or moved to proper

circumferential and longitudinal position. For this purpose a screw-stud 19 (see Figs. 1 and 2), may extend outwardly from an enlargement 17^b of the regulating-sleeve, the tubular member 1 being provided in its wall with a circumferential slot 20 for the passage of said stud, said slot being of sufficient extent in both circumferential and vertical directions to permit of a limited movement of said stud in both directions, sufficient for its adjustment as hereinafter described, and a clamping nut 21 being provided on said stud to bind against the outside of a segmental plate 22 which slides on and around the outer wall of the member 1, the nut 21 in binding the sleeve 17 and plate 22 on member 1 serving to clamp the sleeve 17 in fixed position within the tubular member. Substantially the same adjustment may be obtained in other ways as by forming the ring (see 17′ in Fig. 7) with a screw portion 39 screwing in the bottom of tubular member 1, and providing a set screw 40, if necessary to set the ring in adjusted position. The circumferential adjustment is then obtained by a slight angular movement of the ring, and vertical adjustment by one or more complete rotations thereof.

The sliding valve-ring 18 is carried by a spider or valve member 23 attached to a stem or rod 24 which extends vertically and axially of the tubular member 1 and is slidably supported by arms 25 extending inwardly from the flange 12. Valve-carrier 23 is provided with a piston 26 at its lower end of a diameter approaching that of the tubular member 1 so that said piston will work up and down within said tubular member preferably without touching the same, but so close thereto as to retard or restrict the passage of air from one side to the other of the piston and thereby acting in the manner of a dash-pot to retard the movement of the valve. The lower end of the tubular member 1 in the form shown in Fig. 1 may be provided with a closure formed as a head 30 screwing into said member 1. This valve device is operated by a device responsive to the suctional pressure of the air as it is drawn into the engine cylinder. For this purpose a deflector-plate 27 is provided at the upper end of the valve stem 24, said deflector-plate being of a diameter approximating that of the opening formed by the upper end of the ring 15. Ring 15 has an annular recess 15^a, and the portion of said ring above said recess is preferably upwardly convergent or tapering; for example, in the concavely curved form shown, so as to produce an internal annular knive-edge or lip 15^b surrounding the outlet opening at top of chamber 1, and the deflector-plate 27 when in its lowermost position will approximately fit within and nearly touch this annular edge. The deflector-plate is also preferably provided with a bevel rim 29 forming an annular knife-edge.

The deflector-plate 27 serves in the first place as a means for operation of the valve or constricting means 18 for the air inlet openings by the suctional effect at the outlet opening, and in the second place it serves as a constricting or closure device for the outlet opening so as to concentrate the flow of air thereat, as hereinafter explained.

The orifices 14 open into the recess 15^a of ring 15 and said ring has an annular inwardly inclined surface below said orifices, extending to the flange 12 so that the oil supply means or connection opens into the chamber of member 1 out of the path of movement of the closure or deflector means and communicates continually with said chamber irrespective of such movement.

While the above described carbureter can be used in connection with any suitable fittings to lead the mixture therefrom to the engine, I prefer to provide in connection therewith the combined mixing chamber and throttle-valve 3 shown in the drawing which provides in the throttle-valve chamber itself sufficient space to allow the oil, which is sprayed into the air as it passes the members 15 and 27, to diffuse and quickly distribute itself as vapor throughout the air before the mixture reaches the outlet of the throttle-valve.

The chamber 3 is preferably cylindrical with its axis horizontal and its outlet either at the top or at the upper portion of one side so that a full opportunity for the vaporization and mixture of the oil will be permitted before the same reaches the outlet. The throttle-valves closure member 31 is formed as a wing on a sleeve 32 passing through the throttle-shaft 33 which extends axially of the cylindrical member 3, said wing having a segmental arm or plate 34 extending parallel and in sliding proximity to the cylindrical wall of said chamber.

An opening 35 is provided in the end wall of the chamber 3 to be closed or opened by the wing 31, and another opening 36 is provided in the top of said chamber 3 to be closed or opened by the segmental arm 34.

Connection with the engine may be made by a coupling or connecting device entering either one of the openings 35, 36, according to which gives the most direct passage or is most convenient under the circumstances, the other opening being closed by suitable plug, cap or other closure means, indicated at 37.

The operation of the carbureter is as follows:—When the engine is at rest the valve device 23, 24, 27, will be in lowermost position with the piston 26 resting on the bottom plate 30, and the deflector 27 is on a level with the internal annular edge of the ring 15 and so close to the same that only an inconsiderable quantity of air can pass without lifting the said deflector. As the engine is "turned over" and begins to draw in air, it will create a condition of suction or partial vacuum within the chamber 3 and the pressure of the air on the lower face of the deflector 27 will raise the deflector and valve device 27, 24, 23, this movement being gradual on account of the retarding action of the piston 26.

The regulating sleeve 17 is assumed to have been set by longitudinal and circumferential adjustment in such manner that as the deflector 27 rises the ports at 17^a will be opened by the sliding valve ring 18 sufficiently to maintain a definite condition of suction or vacuum gradually and definitely increasing in proportion to the amount of indraft and the speed of the engine, so as to maintain the proper conditions for uniform mixture at all speeds. The oil-supply regulating float-device 2, 7, is so constructed as to maintain the level of the oil approximately at the level of or slightly below the discharge outlets or orifices 14 when there is no suction in the inner tubular member, so that the condition of suction above-mentioned will result in a definite and graduated flow of the oil into the inner tubular member or chamber 2. On the other hand, this flow will not in any way be influenced by any entraining or injector effect of the air. To insure this, the

flange 12 is made to extend out to the same distance as the internal annular lip of ring 15, and the discharge orifices 14 open into the annular recess 15[a] and are thus out of the path of the direct flow of air upwardly toward the discharge outlet between the members 15 and 27. When the oil has been drawn from the orifices 14 by the suctional effect of the partial vacuum within the chamber 1 it will spread over the surface of the recess 15[a] and will sooner or later be caught by the ascending current of air passing up within the flange 12 and will be carried over the internal annular lip 15[b] and between said lip and the deflector 14. In the operation of the valve device 23, 24, 27, as above-described, the piston 26 serves to dampen or retard the movement thereof so as to avoid any interference with the gradual and uniform regulating action by the inertia or momentum of the said valve devices.

The regulating sleeve 17 is set for proper operation in the following manner:—The binding screw 21 is loosened and said sleeve is moved up from its lowermost position until the lower edge of the ports 17[a] approximate so closely to the lower edge of valve-ring 18, when the latter is in lowermost position, that just the proper condition of suction will be obtained in starting up to draw the requisite amount of oil from the orifices 14 to properly start the engine. The engine is then started up and when it is running at full speed it will be found that the amount of oil supplied will, with the above adjustment, give more than the required or proper quantity of oil supply. The regulating sleeve 17 is then circumferentially adjusted or moved, while maintaining the definite horizontal position to which it has already been brought by the above-described adjustment, until the walls 17[b] between the ports 17[a] overlap the outer ports 16 sufficiently to cut down or reduce the dimensions thereof sufficiently to restore the proper condition of partial vacuum or suction within the tubular member 1.

The proper operation of the regulating devices to secure uniform mixture at different speeds can be effected by longitudinal and circumferential adjustment of the regulating sleeve 17 or 17′ as determined by practice. The ports in said sleeve may be rectangular or may be slanting or curved at one or both sides as indicated in Figs. 8 and 9, according to the special condition and the variation desired.

What I claim is:—

1. A carbureter comprising a tubular chamber having an outlet, and provided with air inlet ports, means for applying suction to said outlet, a regulating device adjustable within said chamber to vary the extension of said inlet ports longitudinally of the chamber, a valve member movable longitudinally within said regulating device, means connected to operate said valve, and responsive to the suction at the outlet, and an oil supply connection opening into said chamber.

2. A carbureter comprising a tubular chamber having an outlet, and provided with air inlet ports, means for applying suction to said outlet, a regulating device adjustable within said chamber to vary the extension of said ports longitudinally and circumferentially of the chamber, a valve member movable within said regulating device, means connected to operate said valve member, and responsive to the suction at the outlet, and an oil supply connection opening into said chamber.

3. A carbureter comprising a tubular chamber having an outlet, and provided with air inlet ports, means for applying suction to said outlet, a regulating device adjustable within said chamber to vary the extension of said ports circumferentially of the chamber, a valve member movable longitudinally within said regulating device, means connected to operate said valve member and responsive to the suction at the outlet, and an oil supply connection opening into said chamber.

4. A carbureter comprising a chamber having air inlet and mixture outlet openings and a recessed portion between said openings, oil supply means opening into said recessed portion, a valve for constricting and closing the air inlet opening and a deflector connected to said valve for constricting the outlet opening, said oil supply connection opening into said chamber out of the path of movement of said deflector, and being continually in communication with the chamber, irrespective of the movement of the deflector.

5. A carbureter comprising a chamber having air inlet and mixture outlet openings, and having an inwardly extending lip around the outlet opening an oil supply connection to said chamber, means for applying suction to the outlet opening, a valve device controlling the inlet opening and a deflector connected to the valve device and of approximately the same diameter as the outlet opening, to act as a closure and constricting means for the outlet opening, said oil supply connection opening into said chamber out of the path of movement of said deflector, and being continually in communication with the chamber irrespective of the movement of the deflector.

6. A carbureter comprising a chamber having air inlet and mixture outlet openings, and having an inwardly extending lip around the outlet opening an oil supply connection to said chamber, means for applying suction to the outlet opening, a valve device controlling the inlet opening and a deflector connected to the valve device and of approximately the same diameter as the outlet opening, to act as a closure and constricting means for the outlet opening, and means for retarding the movement of said valve device and deflector, said oil supply connection opening into said chamber out of the path of movement of said deflector, and being continually in communication with the chamber irrespective of the movement of the deflector.

7. A carbureter comprising a tubular chamber having a mixture outlet at its upper end and provided with air inlets on its side, a sleeve movable within said tubular chamber and provided with ports coöperating with the air inlets, means for adjusting the longitudinal and circumferential position of said sleeve, a valve member slidable within said sleeve and controlling the ports thereof, and a deflector connected to said valve and extending in proximity to the outlet of the chamber for the purpose set forth.

8. A carbureter comprising a chamber provided with outlet and air inlet openings, an oil supply connection opening into said chamber below the outlet opening, valve means controlling and constricting the air inlet openings, a deflector controlling the outlet opening and concentrating the flow of air therethrough to cause spraying of the oil and a throttle valve and mixing chamber connected to the aforesaid chamber and communicating directly with the outlet opening thereof, said throttle valve and mixing chamber having an outlet in its upper portion and a valve member controlling said outlet.

9. In combination with a carbureter, a throttle valve and mixing chamber having similar outlets in its upper and side walls, a valve member mounted in said chamber and coöperating with both of said outlets, and a plug interchangeably fitting said outlets.

In testimony whereof, I have hereunto set my hand at Los Angeles California this 24th day of January 1905.

ALFRED C. STEWART.

In presence of—
A. P. KNIGHT,
JULIA TOWNSEND.