C. H. CLAUDEL.

CARBURETER.

APPLICATION FILED FEB. 6, 1912.

1,170,416. Patented Feb. 1, 1916.

3 SHEETS—SHEET 1.

Fig. 1

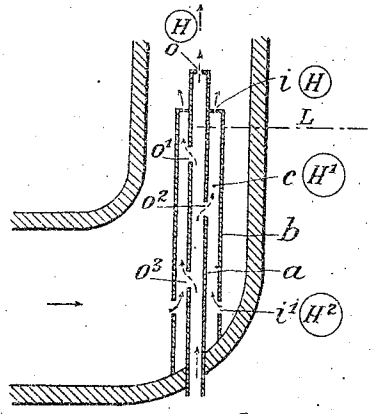


Fig. 2

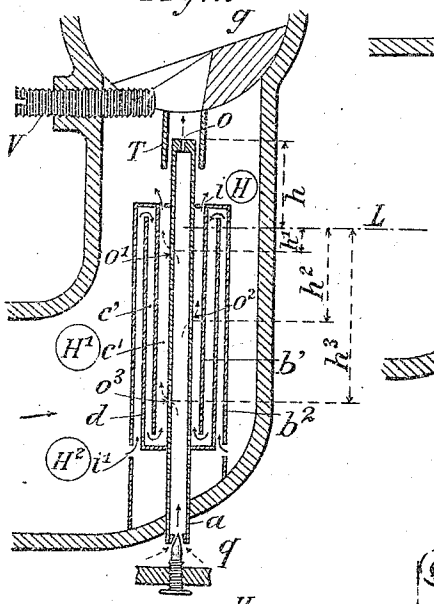


Fig. 3

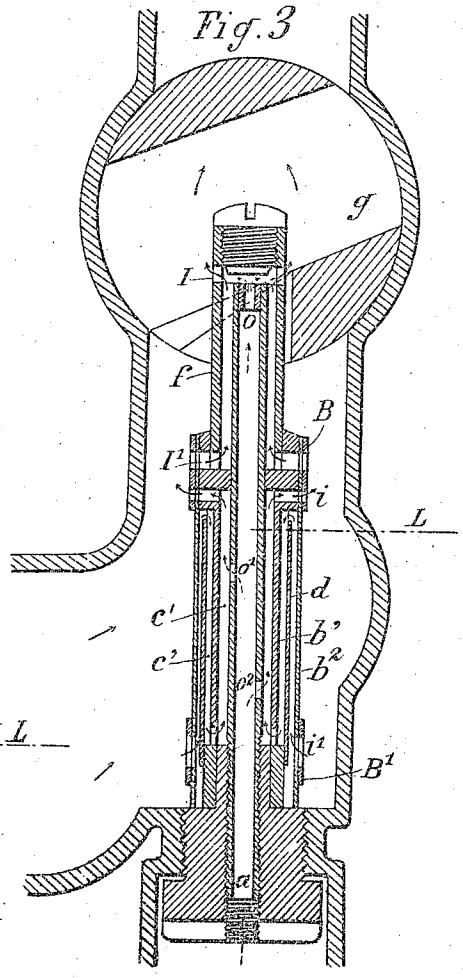


Fig. 4

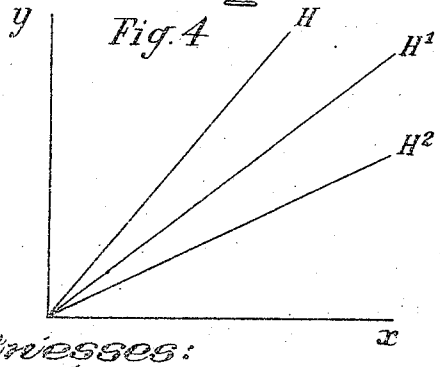
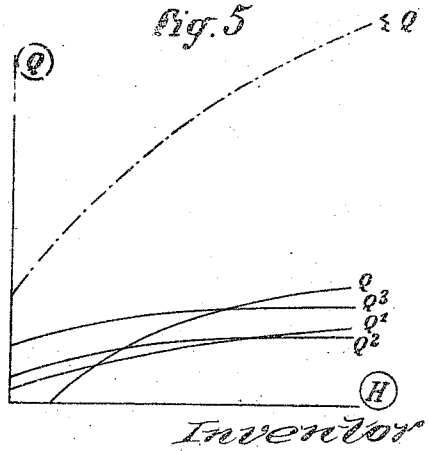


Fig. 5



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3 SHEETS—SHEET 2.

Fig. 8.

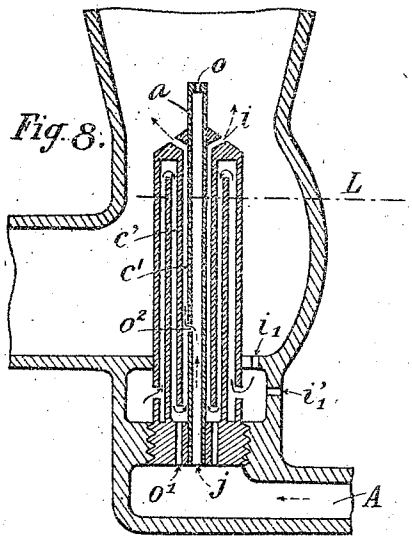


Fig. 6.

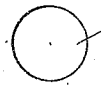


Fig. 7.

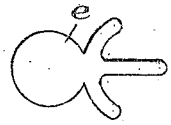
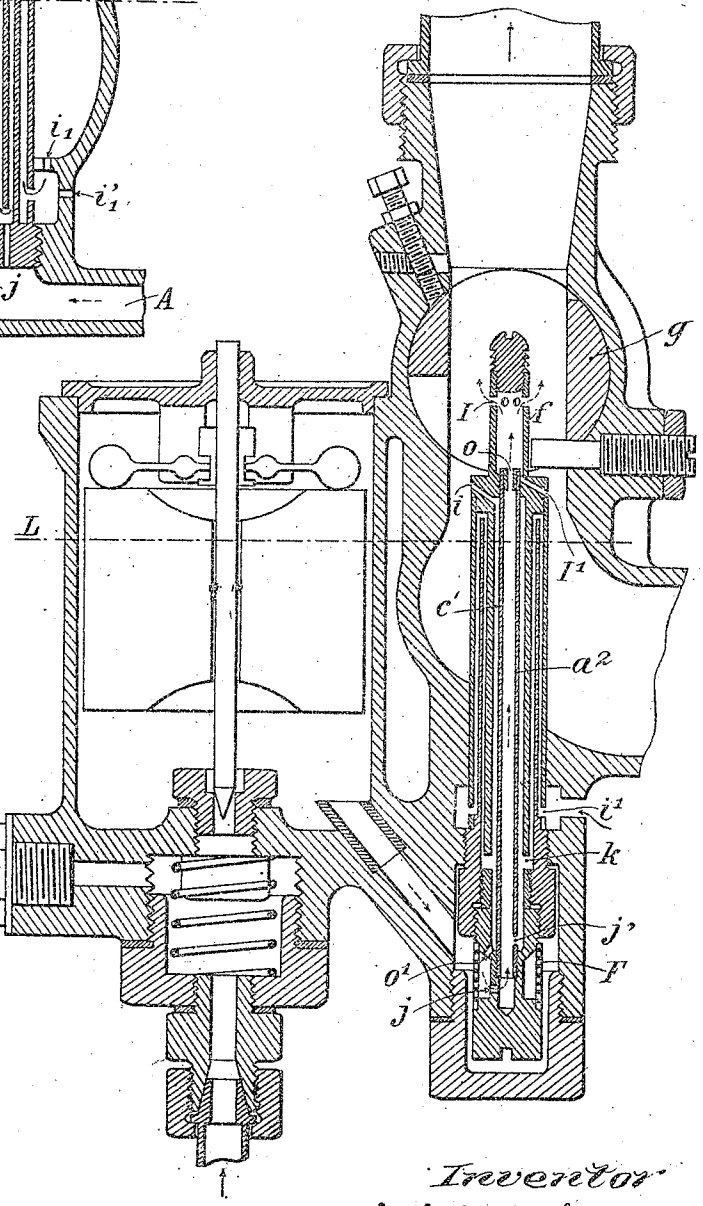


Fig. 9.



Witnesses

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1,170,416.

Patented Feb. 1, 1916.

3 SHEETS—SHEET 3.

Fig. 10.

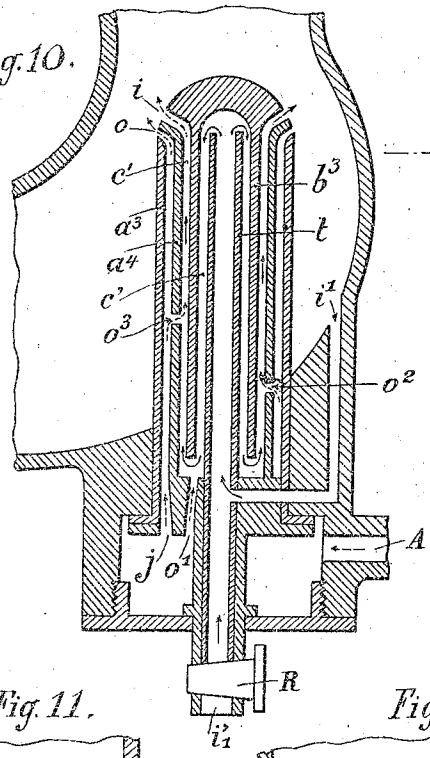


Fig. 11.

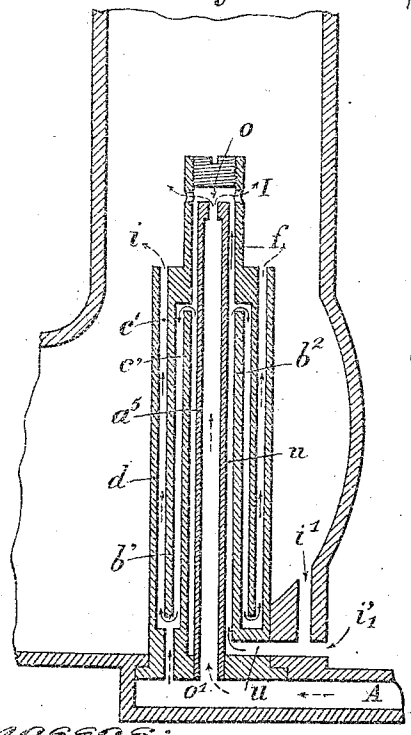
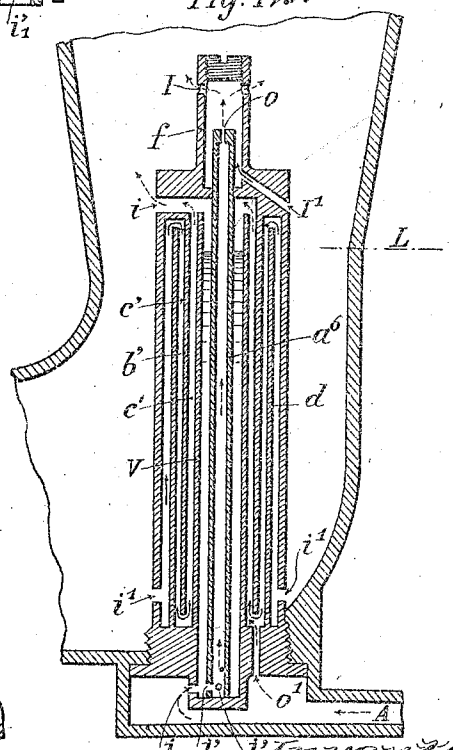


Fig. 12.



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UNITED STATES PATENT OFFICE.

CHARLES HENRI CLAUDEL, OF LEVALLOIS-PERRET, FRANCE.

CARBURETER.

1,170,416. Specification of Letters Patent. Patented Feb. 1, 1916.

Application filed February 6, 1912. Serial No. 675,738.

To all whom it may concern:

Be it known that I, CHARLES HENRI CLAUDEL, a citizen of the Republic of France, residing at 41 Rue des Arts, Levallois-Perret, Seine, France, have invented certain new and useful Improvements in the Carbureters for Explosion-Motors, of which the following is a specification.

The invention has for its object a form of jet permitting of automatically modifying the supply of liquid in proportion to the suction in accordance with a predetermined curve, in such a manner as to obtain a mixture of air and carburetant which under all conditions conforms to the most suitable proportions (which are substantially constant in the case of explosion motors).

In the accompanying drawing: Figure 1 is a diagrammatic section of an embodiment of the invention which is given by way of example. Fig. 2 shows, in combination with a regulating plug, the same device provided with a baffle cup to prevent the carburetant being discharged to the exterior during stoppage. Fig. 3 represents the jet surmounted by an air suction cage likewise in combination with a plug regulating the admission and the carburation. Fig. 4 is a graphic representation of the variation of vacuum inside the jacket which is indicated merely diagrammatically. Fig. 5 shows, also by way of example and diagrammatically, the variations of the deliveries from the multiple orifices furnishing a total supply varying in accordance with a predetermined law. Figs. 6 and 7 illustrate by way of example a form of the orifices of a rotary key combined with the jet. Fig. 8 shows diagrammatically a modification in which the annular chamber is supplied with spirit partly directly from the spirit inlet and partly by the intermediary of the low speed nozzle. Fig. 9 illustrates a complete method of carrying another modification into practice. Fig. 10 represents diagrammatically a modification in which the arrangement is reversed, the nozzle supplying the spirit being arranged at the periphery and the baffle chamber furnishing the mixture of air and carburetant being arranged at the middle, the air reaching it at the center. Fig. 11 illustrates a partially reversed arrangement; the nozzle furnishing the spirit is located at the middle but the air traverses the annular chamber from the center to the periphery at the same time supplying the cage of the low speed orifice. Fig. 12 shows the combination of the device with a pipette which becomes filled with spirit to a variable level for supplying the nozzle furnishing the low speed orifice.

In accordance with the invention a jet a (Fig. 1) for supplying the carburetant comprises one or more orifices o opening into the suction column; this jet is combined with a tube b (an external tube in the construction illustrated) in such a manner as to form a jacket provided with perforations such as i and i' arranged in regions of different degrees of vacuum in such a manner as to create an air current in this jacket, one or more orifices such as o' o^2 o^3 conducting the carburetant into the jacket at points all or some of which are located below the supply level L, and in derivation in the gaseous current referred to above in accordance with the invention described in Eveno's French Patent No. 336434 of the 20th October 1903 of which the present applicant is the inventor and proprietor.

Under the influence of the suction a vacuum H is established in proximity to i (difference between the pressure prevailing in this zone and the atmospheric pressure acting upon the supply-reservoir) while i' is arranged at any suitable point (in the conduit or outside) where the vacuum H^2 is less; consequently a vacuum H′ intermediate between H and H^2 is established in the annular chamber c and consequently a branch gaseous current proceeding form i' to i and into which the orifices o' o^2 o^3 deliver under the influence of the difference of level and of the vacuum H′ prevailing in the annular chamber. As a result the jets are subjected to degrees of vacuum which are essentially variable and different because the pressure H is thus always greater than H′.

On stoppage it is obvious that the carburetant liquid would be discharged through the orifices under charge (*i. e.* below the feed level) such as o^3 into the conduit. In order to prevent this a cup d is provided as shown in the following figures, the upper edge of this cup slightly exceeding the level L and the jacket b^2 is provided with an inverted tube b' entering the cup d and forming a baffle. On stoppage the liquid enters the annular chamber c' c' through the orifices and fills this chamber to the feed level L. During running on the other hand the

chamber c' c' is empty of liquid and the air drawn through i' follows the path indicated by the firm arrows, ascends along the nozzle a in passing over the orifices o' o^2 o^3 through which the carburetant or mixture fluid is sprayed (arrows in broken lines) and the mixture is injected at i into the column of air drawn in; the liquid is sprayed partly through the orifices, o' o^2 o^3 by the intermediary of the branch current in the chamber c' and in part through the orifice o directly. If H′ is the mean vacuum in the annular chamber c; h' h^2 h^3 . . . the difference of level with L; s s' s^2 s^3 . . . the sections of the orifices, o o' o^2 o^3 . . . the respective partial deliveries Q Q′ Q^2 Q^3 . . . will be as follows: As regards o a function of (H—h) and as regards o' o^2 o^3 a function of (H′+h') (H′+h^2), etc., in which h h' h^2 h^3 will have different signs according as L is above or below the respective orifices. If the suction of the motor increases the vacuum H increases more rapidly than H^2 and consequently H′ increases in the manner indicated diagrammatically in Fig 4 for example in which the ordinates represent the degrees of vacuum and the abcissae the speeds of the motor or the increasing apertures of the gas throttle. The deliveries through the orifices o c' o^2 o^3 then vary as indicated in Fig. 5 for example; it will be noted that these curves can be varied at will in selecting the variables i i' s s' s^2 . . . h h' h^2 . . . in such a manner as to obtain the desired retarded flow (relatively to what would occur if all the orifices opened directly like o into the suction column) necessary for obtaining the proper carburation absolutely automatically. This automatic jet may be mounted on a conduit proceeding to the motor and provided with a suitable form of gas throttle. It is particularly advantageous to combine it as shown in Figs. 2, 3 etc., with the plug of a cock g, the admission orifice e and discharge orifice e' of the port which constitutes the carburation chamber being shaped as indicated in Figs. 6 and 7, for example, and dimensioned in such a manner that their ratio which is variable with the aperture of the plug causes the vacuum in the port of this plug to vary in accordance with a predetermined law, the orifice or group of outer orifices o of the jacket being subjected to this vacuum. In Fig. 2 a tube T the upper extremity of which exactly fits against the surface of the orifice e of the plug transmits to the spraying orifice o the vacuum prevailing in the interior of the plug; in the cosntruction illustrated a small annular space is left between the tube T and the nozzle a and through this space the air is drawn. In Fig. 3 the upper part of the jet with orifice o enters the port in the plug itself; in this same figure the upper part of the jet is also represented as surrounded by a cage f exerting suction at I′ at a point above the plug and opening at I in the interior of the plug. The cage f in Fig. 3 or the interval between the tube T and the jet a of Fig. 2 serves to diminish the effect of an acceleration of speed on the supply of carburetant delivered through the orifice o (if this orifice furnishes a suitable supply at low speeds) and thus to prevent an excess of carburetant at high speeds, since the flow of air entering by way of I′ reduces the suction at o. The cage in Fig. 3 might be dispensed with without affecting the principle of invention and the interval between T and a in Fig. 2 might also be dispensed with in which case T exactly fits the jet a or merely forms a continuation thereof.

The effect of the combination of the jet with the cock plug g is as follows: The upper part of the jet plays an exclusive or at all events a preponderating part on slowing down, that is to say when the plug is closed or almost closed; in these conditions the vacuum behind the plug is zero or very small while owing to the special arrangement of the orifices of this plug the vacuum in the interior is still very appreciable. Therefore the orifices o supply the fuel chiefly when the motor is slowing down and running at low speeds, with partial throttling of the gas, while the orifices i which are fed through o', o^2 . . . supply the fuel more particularly when the motor is running at full speed, the fuel passing through the latter orifices being vaporized by the air drawn in at i'.

In Fig. 8, instead of the supply orifices for the annular chamber c', such as the orifices o' o^2 . . . being perforated in the walls of the nozzle a and supplied at the lower part of this nozzle, they here place the annular chamber directly in communication with the conduit A which conducts the carburetant from the supply reservoir. As regards the air inlet, which also supplies the annular chamber, it may be arranged either at a point i' in the interior of the suction conduit for the gases at a zone where the vacuum is smaller than in proximity to the outlet i, or at the exterior at i'_1, or as shown in the figure both at i' and i'_1. It will of course be understood that this arrangement (that is to say the orifices o' directly supplying the annular chamber c', c') may be combined with orifices such as o^2 which supply it, as before, by the intermediary of the nozzle a'.

Fig. 9 represents another construction in which, as in the preceding figure, the chamber c' is supplied with carburetant directly from the reservoir and without having previously to pass through the lower part of the nozzle a^2 which supplies the orifice o external to the chamber c'. Orifices o' protected by the filter F and arranged at a

lower level than the constant feed level L or at different graduated levels, directly supply the annular chamber c', c', while this chamber is traversed by an air current drawn in at i' and issuing at i. The nozzle a^2 is then supplied directly through an orifice j or indirectly through the annular chamber c', c' through one or more orifices j' perforated in the wall of the nozzle a^2 or both directly and indirectly through j and j' as shown. The vacuum H′ which prevails in the chamber c', c' obviously depends upon the inlets i', outlets i, and upon the intermediate resistances of the orifices k in particular. In the figure the orifice o external to the chamber c', c' is surrounded by a cage through which suction is exerted at I′ at the exterior of the relating plug g while the discharge takes place at I in the interior of the plug. It is obvious that the arrangements can be reversed without departing from the principle of the invention. Figs. 10 and 11 give examples of this.

In Fig. 10 the arrangement is entirely reversed; the spirit is sprayed directly upon the periphery in a double nozzle, that is to say, in an annular jet while the cup portion through which the mixture of air and carburetant passes is arranged at the center of this double nozzle. The direct nozzle is formed of two concentric tubes a^3, a^4 supplied, for example, directly through orifices j and opening through orifices or through an annular slot o above the plane of charge L. The air is drawn in through a tube t either at the exterior at i'_1 or at a point i' inside the suction conduit; this tube is surrounded by a tube forming a bell or baffle b^3 the upper part of which, together with a^4, forms an annular slot or orifice i. The air enters through the tube t, circulates in the annular chamber c', c' in the direction indicated by the arrows in carrying with it the spirit which enters this chamber through one or more orifices, all or a part of which are under charge, which place it in communication either directly with the spirit inlet o' or with the interior of the nozzle a^3, a^4 (orifices o^2 o^3); the emulsioned mixture of air and carburetant then escapes through the orifices i. Mechanical or automatic regulating members such as a cock R can be provided on the tube t supplying the air.

In Fig. 11 the nozzle a^5, which directly supplies the orifice o provided with a cage f, is supplied directly by a constant level reservoir. The passage of the air in the annular chamber c', c' here takes place from the interior to the exterior that is to say inversely to the first constructions represented while the spirit enters at the center as in the first constructions; the arrangement is therefore partially reversed. With this object the air drawn in either at i' or at the exterior at i'_1 passes through the passage u into the annular space between the tube b^4 and the nozzle a^5. This air thus simultaneously supplies the top cage (the discharge orifices of which are marked I) and the annular baffle chamber c', c', (the discharge orifices of which are marked i); the spirit enters this chamber through the orifice o'.

In Fig. 12 the orifice o of the nozzle a^6 is supplied from the constant level reservoir through a variable level receptacle v which is interposed between them and has its upper part subjected to the degree of vacuum existing at a predetermined point in the suction column, as for example at i, whence it will be readily seen that the level of the liquid fuel in this receptacle v will vary in accordance with the vacuum at i. In the example illustrated the liquid fuel enters the receptacle v through the orifice or orifices j and passes into the nozzle a^6 through the orifice or orifices j' (as specified in French Patent No. 418481 of the 21st July 1910). Around the receptacle v the same arrangement is provided as in the construction shown in Fig. 3. The air entering at i' and, after is has become charged with spirit in the chamber c', c', issuing through the orifices i. The spirit enters the annular chamber through one or more orifices such as o'. This method of supplying the nozzle a by the intermediary of a variable-level receptacle, can of course be combined with one or other of the various forms of jet described. The orifices i' may be regulated by means of a turning or sliding ring B′ for example (Fig. 3) for varying the degrees of vacuum and consequently the supplies of liquid. The same applies to the orifices i or I′ or to both by means of a ring B. In any case the total delivery from the several nozzles can be regulated by means of a pin valve q for example (Fig. 2). A screw V, such as shown in Fig. 2, for example, permits of reducing the section for the admission of the air in the plug approximately to the surface of the jet or of its cage when the plug is completely closed and at the same time permits of regulating this air admission in the closed position.

I claim as my invention:

1. A carbureter comprising a nozzle discharging into the suction space, means for admitting liquid fuel to said nozzle, a chamber associated with the nozzle and provided at a point of greater suction with an orifice through which mixed air and fuel are discharged independently of said nozzle and at a point of less suction with an inlet orifice for the admission of air, and means for supplying the chamber with liquid fuel through an orifice distinct from the air inlet orifice.

2. A carbureter comprising a nozzle dis-

charging into the suction space above the constant supply level, means for admitting liquid fuel to said nozzle, and a chamber associated with the nozzle and provided with a discharge orifice which is independent of said nozzle and is located at a point of greater suction, with an air inlet orifice at a point of less suction, and with a distinct orifice for admitting liquid fuel to the chamber below the constant supply level.

3. A carbureter comprising a nozzle discharging into the suction space above the constant supply level, means for supplying said nozzle with liquid fuel, and a concentric tube associated with the nozzle to form a chamber, said chamber being provided with an orifice through which mixed air and fuel are discharged independently of said nozzle, with an air inlet orifice located at a point of less suction, and with an orifice distinct from the air inlet orifice for admitting liquid fuel below the constant supply level.

4. A carbureter comprising a nozzle discharging into the suction space, means for supplying the nozzle with liquid fuel, and a concentric tube associated with said nozzle to form an annular chamber having an orifice through which mixed air and fuel are discharged independently of said nozzle and also having an air inlet orifice, the nozzle being provided with a passage leading into said chamber independently of said air inlet orifice and at a point below the constant supply level.

5. A carbureter comprising a nozzle discharging into the suction space, means for supplying the nozzle with liquid fuel, and a concentric tube associated with said nozzle to form an annular chamber having a discharge orifice leading therefrom and distinct orifices for the admission of air thereto, the lateral walls of the nozzle being provided with a plurality of openings located at different heights below the constant supply level for admitting liquid fuel to said chamber.

6. A carbureter comprising a nozzle discharging into the suction space and means for supplying liquid fuel thereto, a chamber associated with the nozzle and provided with air inlet and discharge orifices located at points of different suction, means for admitting liquid fuel to said chamber below the constant supply level and independently of its air-inlet orifices, and a receptacle extending above the constant supply level for retaining the fuel admitted to said chamber.

7. A carbureter comprising a discharge nozzle and means for supplying the same with liquid fuel, a concentric tube associated with said nozzle to form a chamber having an air inlet orifice and also having a discharge orifice located in the suction space of the carbureter, distinct orifices for admitting liquid fuel to said chamber below the constant supply level, and a tubular receptacle concentric with said nozzle and chamber to retain liquid fuel in the latter, said receptacle having its top located above the constant supply level and its bottom located below the point of admission of air to said chamber.

8. A carbureter comprising a nozzle, a cup surrounding the same with its upper edge located above the constant supply level, a sleeve concentric with the nozzle and forming therewith a chamber having an air inlet and an outlet orifice subjected to the vacuum in the suction space, a concentric tube entering said chamber from the top of the sleeve and extending into proximity to the bottom of the cup to form a baffle, and means for admitting liquid fuel to said nozzle and chamber.

9. A carbureter comprising a discharge nozzle and means for supplying the same with liquid fuel, a concentric tube forming in connection with said nozzle a chamber having a discharge orifice located in the suction space and also having an orifice for the admission of air, means for admitting liquid fuel to said chamber independently of its air inlet orifice at a point below the constant supply level, a concentric tube forming a receptacle to retain the liquid fuel, said tube having its top located above the constant supply level and its bottom located below the air inlet orifice leading to the chamber, and another concentric tube surrounding said receptacle and provided with an orifice for admitting air from a region of diminished suction.

10. A carbureter comprising a nozzle discharging into the suction space above the constant supply level, means for supplying the nozzle with liquid fuel, concentric tubes associated with said nozzle to provide a chamber containing baffles, said chamber being provided at one extremity with an air inlet orifice and at its other extremity with an orifice for discharging the mixture into the suction space, means for admitting liquid fuel to said chamber directly from the fuel supply at a point below the constant supply level, and a passage providing communication between the chamber and the nozzle below said air-inlet orifice.

11. A carbureter comprising a nozzle discharging into the suction space above the constant supply level, concentric tubes forming in connection with said nozzle a chamber containing baffles and provided at one extremity with an air inlet orifice and at the other extremity with an orifice for discharging the mixture into the suction space, said chamber being also provided with an independent orifice for admitting liquid fuel below the constant supply level and with an additional orifice providing communication between the chamber and the nozzle below

the air-inlet orifice, and a passage providing direct communication between the nozzle and the fuel supply for admitting liquid fuel to said nozzle.

12. A carbureter comprising a nozzle discharging into the suction space above the constant supply level and communicating at its lower portion with a variable-level receptacle for liquid fuel, said receptacle being open at its upper end and having an orifice for admitting the liquid fuel below the constant supply level, and a chamber associated with said nozzle and provided with a discharge orifice located at a point of greater suction, an air-inlet orifice located at a point of less suction, and a distinct orifice for admitting the liquid fuel thereto.

13. A carbureter comprising a nozzle, means for supplying liquid fuel thereto, a chamber associated with said nozzle and terminating below the upper end thereof, said chamber being provided with an air inlet and with a discharge orifice subjected to the vacuum in the suction space, means for admitting liquid fuel to the chamber, and a cage surrounding the discharge orifice of the nozzle above said chamber and having an air suction inlet at one extremity and a discharge orifice at its other extremity.

14. A carbureter comprising a nozzle, means for supplying liquid fuel thereto, a chamber associated with said nozzle and provided with an air inlet and with an inlet for liquid fuel located below the supply level, and a cage surrounding the upper end of the supply nozzle and communicating at its lower end with the suction space, and a discharge orifice leading from said chamber adjacent to the lower end of the cage.

15. A carbureter comprising a nozzle and means for supplying liquid fuel thereto, a cock plug having a variable port therein, a chamber associated with the nozzle and provided with an air inlet and with a discharge orifice, means for supplying liquid fuel to the chamber, and a cage surrounding the discharge end of the nozzle within the port of the cock plug and having an orifice merging with the discharge orifice of the chamber and subjected to the vacuum in the suction space.

16. A carbureter comprising a nozzle and means for supplying liquid fuel thereto, a chamber associated with the nozzle and terminating below the upper end thereof, the chamber being provided with an air inlet and with a discharge orifice subjected to the vacuum in the suction space, means for admitting liquid fuel to the chamber, a cage surrounding the discharge end of the nozzle above said chamber and having inlet and discharge orifices, and means for regulating the inlet orifices of said chamber and cage.

17. A carbureter comprising a nozzle having a discharge orifice located above the constant supply level, means for admitting liquid fuel to said nozzle, and a chamber associated with the nozzle and provided with an air inlet orifice and with a discharge orifice located respectively at points of less and greater suction, and also with a distinct orifice located below the constant supply level for admitting liquid fuel to said chamber, in combination with a cock-plug arranged to subject the discharge orifice of the nozzle to the suction existing in the interior of the passage through said plug.

18. A carbureter comprising a nozzle having a discharge orifice located above the constant supply level, means for admitting liquid fuel to said nozzle, and a chamber associated with the nozzle and provided with an air inlet orifice and with a discharge orifice located respectively at points of less and greater suction, and also with a distinct orifice located below the constant supply level for admitting liquid fuel to said chamber, in combination with a cock-plug having a passage in which the discharge orifice of said nozzle is located, the discharge orifice of said chamber being located outside of said plug.

19. A carbureter comprising a nozzle having a discharge orifice surrounded by a cage, means for admitting liquid fuel to said nozzle, and a chamber associated with the nozzle and provided with an air inlet orifice and with a discharge orifice located respectively at points of less and greater suction, and also with a distinct orifice located below the constant supply level for admitting liquid fuel to said chamber, in combination with a cock-plug having a passage in which the discharge orifice of said cage is located, the point of admission of air to said cage and the discharge orifice from said chamber being located outside of said plug.

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

CHARLES HENRI CLAUDEL.

Witnesses:
GEORGES PROTTE,
H. C. COXE.