Jan. 31, 1933. C. H. CLAUDEL 1,895,785

CARBURETOR

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Fig. 2

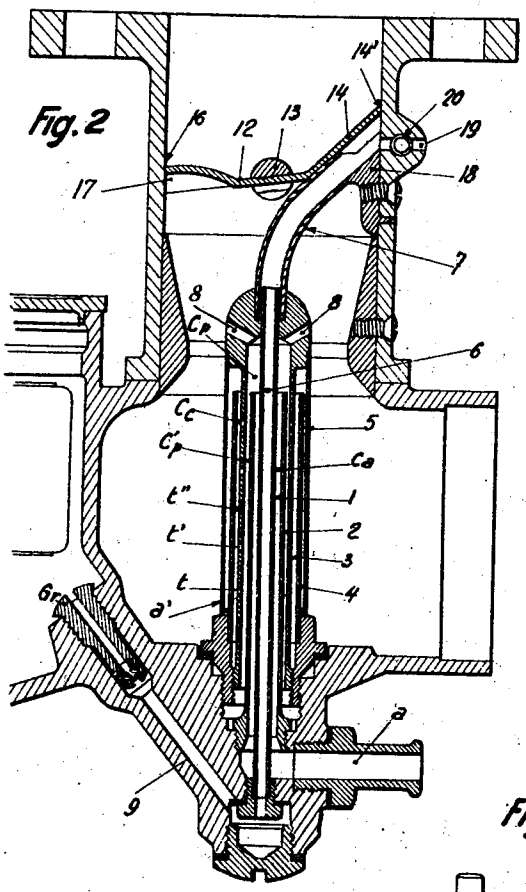


Fig. 3

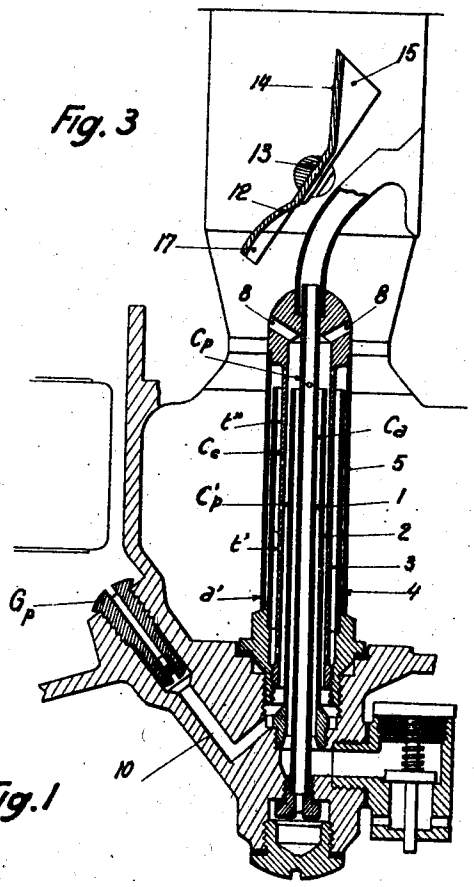
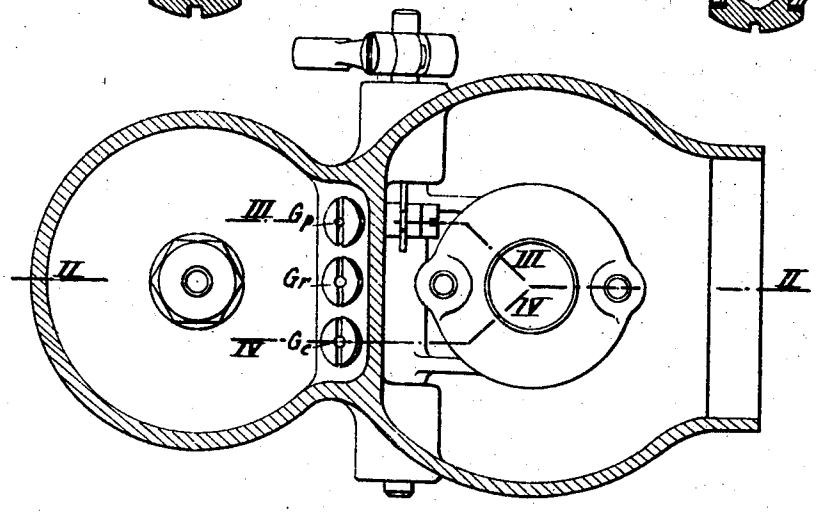


Fig. 1



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Fig. 4

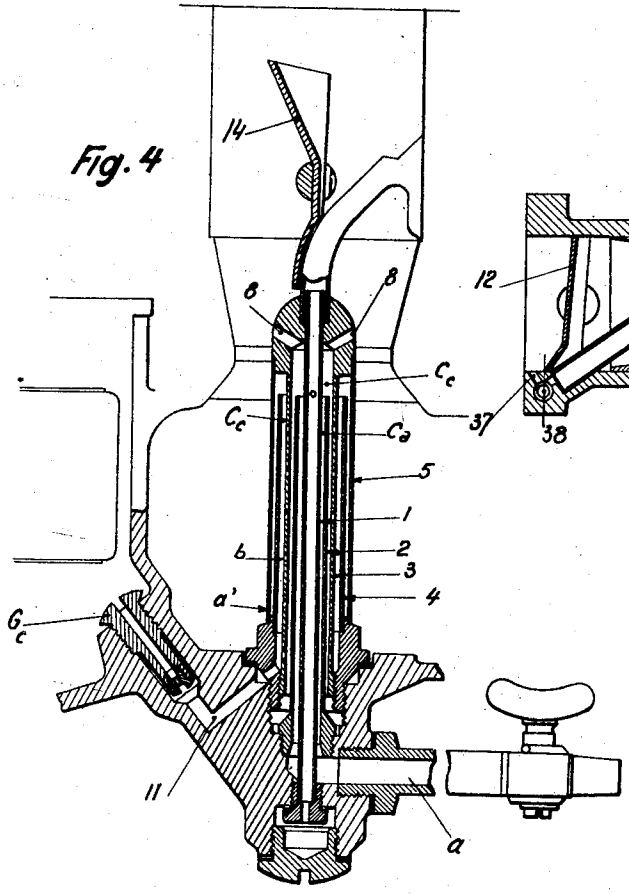


Fig. 8

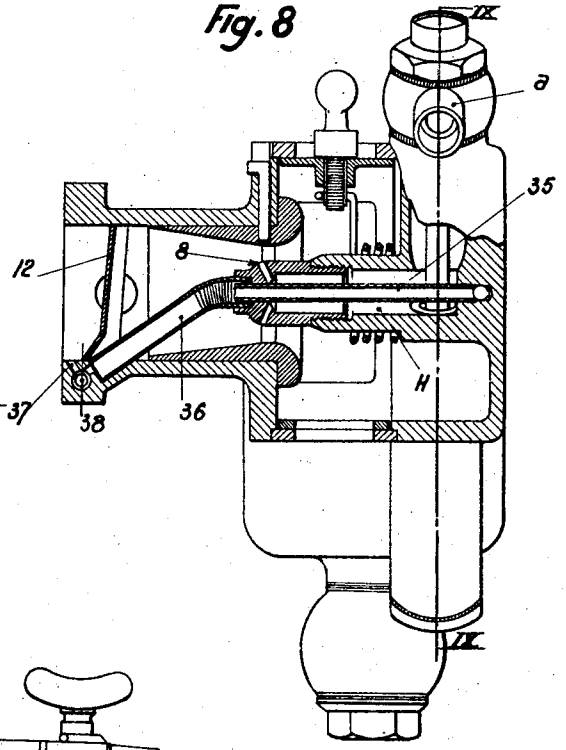


Fig. 5

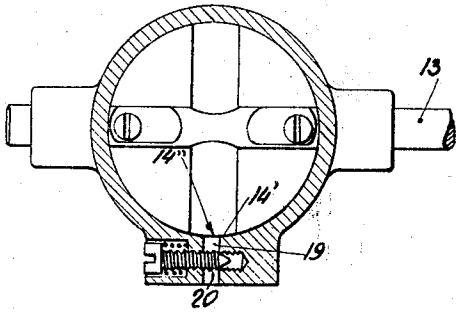
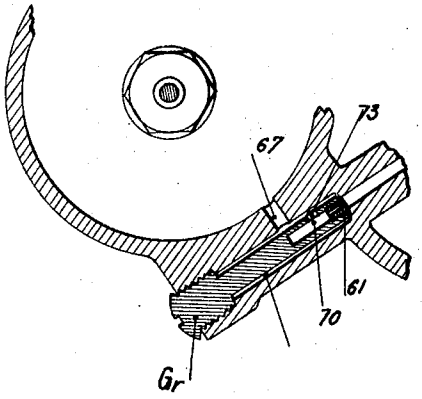


Fig. 12



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Fig. 6

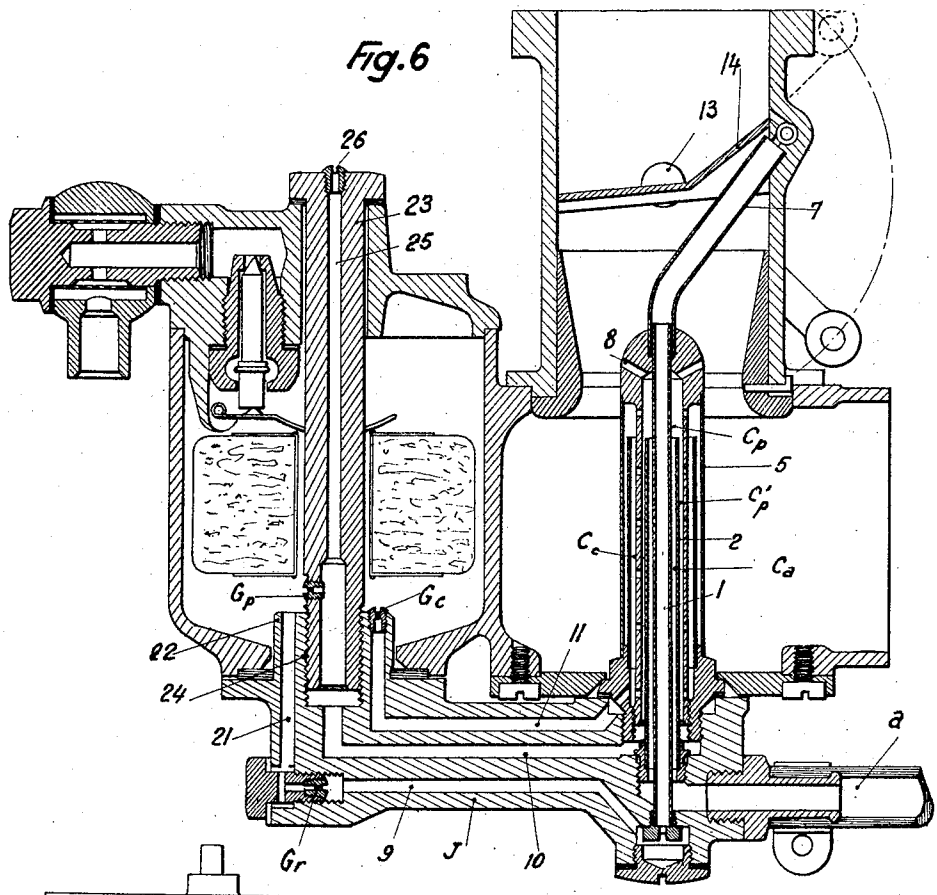
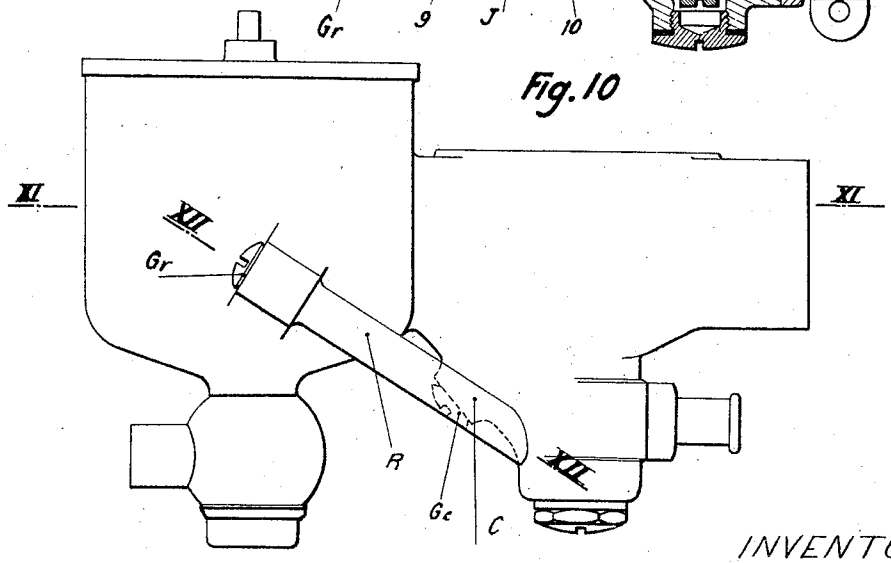


Fig. 10



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Fig. 7

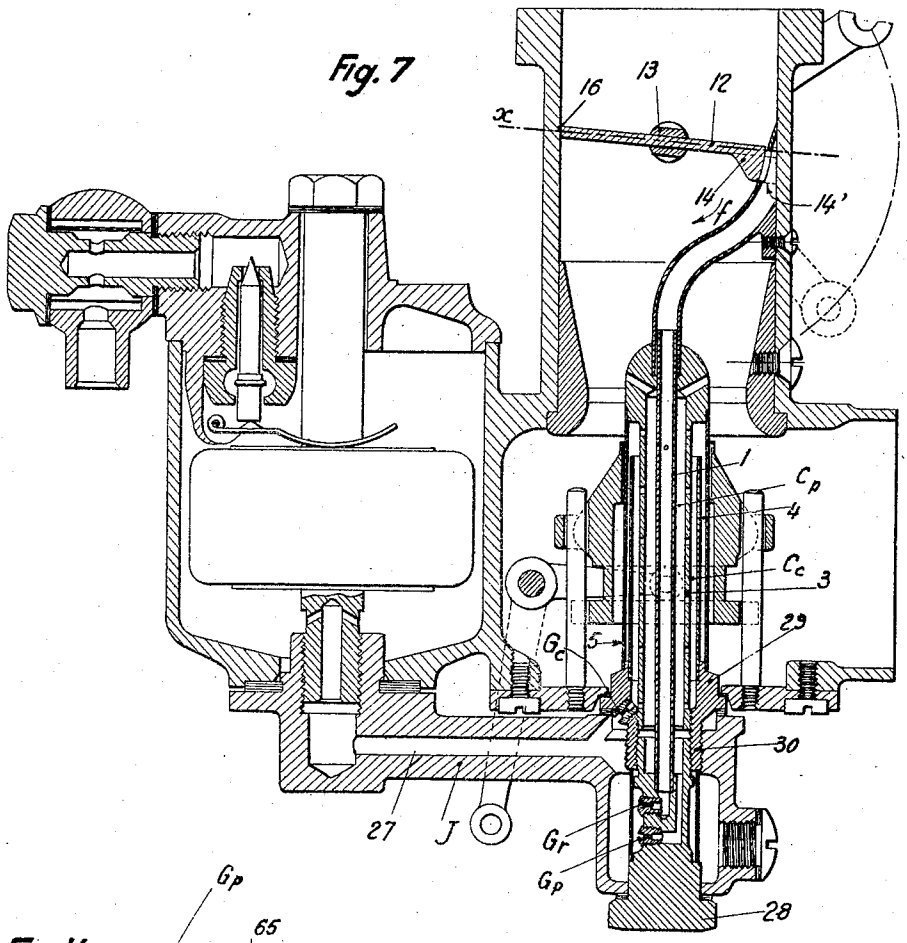
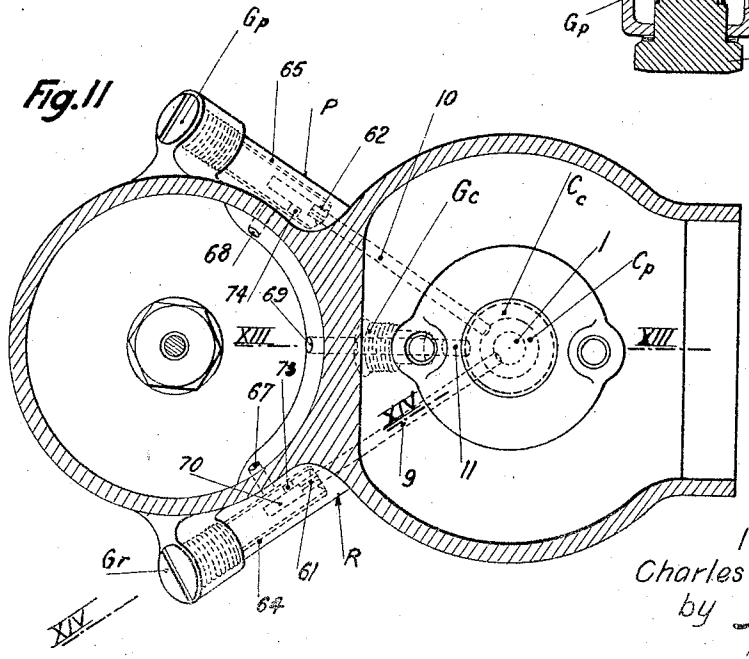


Fig. 11



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Fig. 9

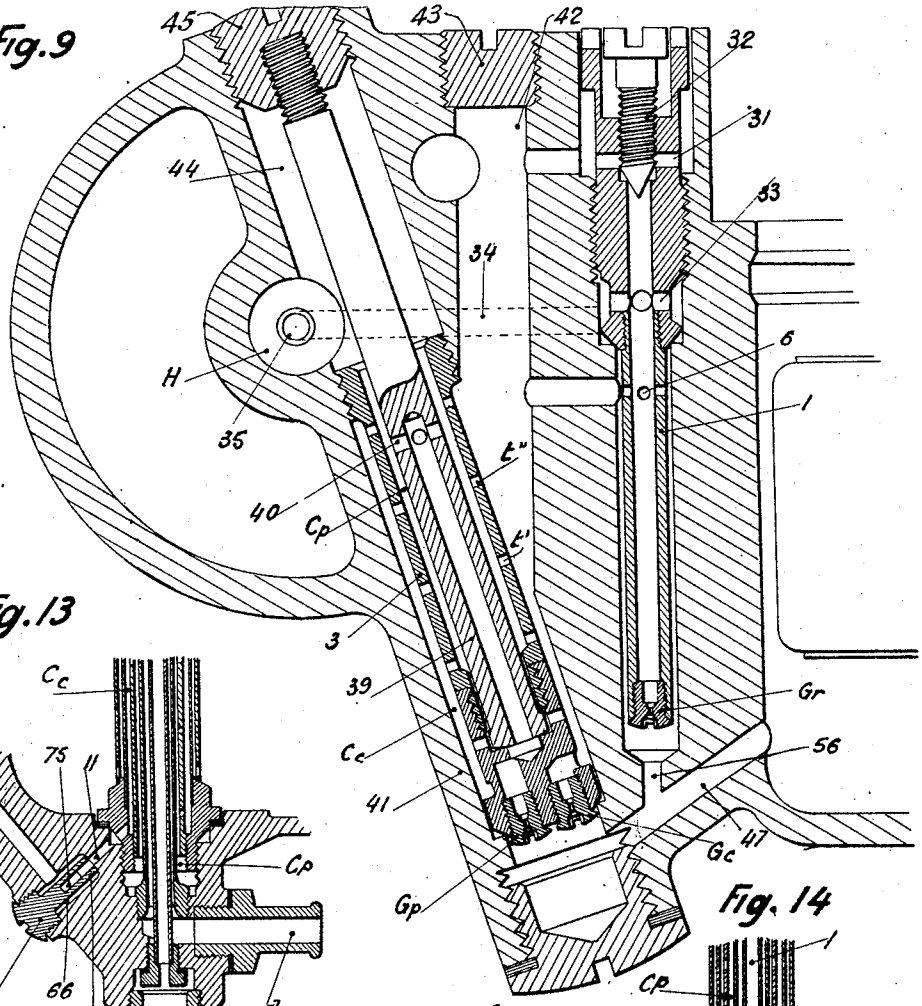


Fig. 13

Fig. 14

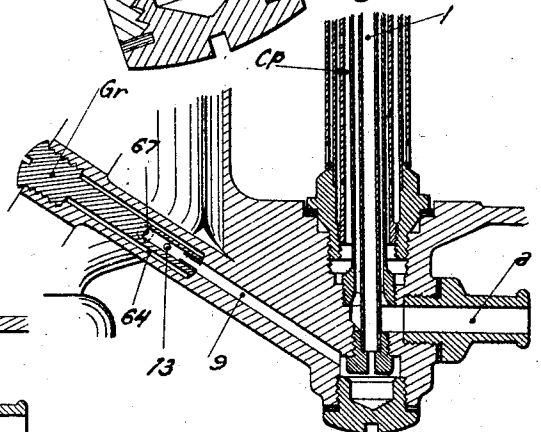
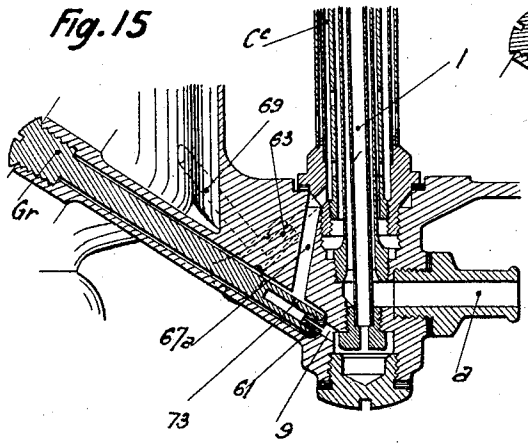


Fig. 15



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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed November 9, 1928, Serial No. 318,156, and in France March 31, 1928. Renewed November 3, 1932.

The present invention relates to improvements in carburetors, and it has for its object the better adaptation of such apparatus to the various operating conditions in which they are used.

The invention is characterized firstly by the fact that the carburetor comprises, in combination with the calibrated plug for slow speed supplying the corresponding nozzle which operates in the known manner for the slow or reduced speed and running light, two other calibrated plugs, whereof one is employed for the high speeds (on level) and supplies the gas-mixture or emulsion chamber communicating directly with the orifices for the normal feed of the said emulsion in the known manner, and the second is employed for the slow speeds (on grades) and supplies another chamber which is separated from the preceding by small holes and is hence subjected to a less suction or vacuum than that prevailing in the first chamber. In the known Claudel arrangement of the emulsion-producing device, the separate chamber operating for slow speeds will advantageously consist of an annular chamber surrounding the diffusing tube.

The aforesaid combination can be obtained with any arrangement of the reduced speed nozzle, and chiefly a flexible nozzle whose free end is movable with the throttle of the mixture towards the engine.

According to the invention, I prefer to use a throttle of the butterfly type having a special form, such that in its position adjacent the outlet of the reduced speed nozzle, the opening of the butterfly valve increases more rapidly than the opening for the air at the periphery of said valve, so that the output of said reduced speed nozzle will be increased and the "passing point" can be eliminated while providing for a simple construction of the valve device.

Another feature of the invention consists in the use, in combination with the said valve, of an extended part of the central reduced speed nozzle, which instead of being flexible, is rigid, and supplies the emulsion upon the side of the suction conduit, in a slot of the said valve.

The accompanying drawings show by way of example various embodiments of the invention comprising a certain number of carburetors to which my said improvements are applied.

Figs. 1 to 5 show a vertical carburetor in which the three calibrated plugs are disposed at the bottom of the float chamber. Fig 1 is a plan view, Figs. 2, 3 and 4 are cross sections respectively through lines II—II, line III—III—II, line IV—IV—II of Fig. 1.

Fig. 5 is a horizontal section through line V—V of Fig. 2 showing the special throttle valve used in cooperation with the reduced speed calibrated plug.

Fig. 6 shows in vertical cross section a vertical carburetor, with another arrangement of the calibrated plugs.

Fig. 7 shows in the same manner another arrangement of the three calibrated plugs and a contrary arrangement of the throttle valve. Figs. 8 and 9 show an application of the invention to a horizontal carburetor, Fig. 8 is a vertical section on the axis of the set of emulsion delivery nozzles, and Fig. 9 shows on a larger scale and with a little modification a cross section on line IX—IX of Fig. 8.

Figs. 10 to 15 show another construction in which the various calibrated plugs can be removed with great facility. Fig. 10 is an elevational view of the carburetor, on the side next the reduced speed calibrated plug. Fig. 11 is a horizontal section on the line XI—XI of Fig. 10. Fig. 12 is a partial section on the line XII—XII of Fig. 10. Figs. 13 and 14 are vertical sections respectively on the lines XIII—XIII and XIV—XIV of Fig. 11. Fig. 15 is a view analogous to Fig. 14, for the series feed of the slow-speed and the reduced speed calibrated plugs.

In the carburetors shown in Figs. 1 to 5, the emulsion producing arrangement is composed as follows. The central nozzle 1 serves for the reduced speed; the guard tube 2 is optionally used, and can be eliminated, and this tube only serves to form around the nozzle 1 a chamber C_a connected with a in order to receive the correcting air of the emulsion. The diffusing tube 3 is of the known Claudel type and has three vertically spaced holes t t' t''

etc. The guard tube 4 and the outer tube 5 with air inlet holes a' are also employed. The reduced speed nozzle 1 is pierced with a hole 6 for the admission of the air of the emulsion, and said emulsion is conducted by a rigid extension tube 7 to the discharge point which is adjacent the edge of the throttle valve. The diffusing tube 3 is situated between the guard tubes 2 and 4, and forms two chambers with the latter, comprising the internal chamber C_p in direct connection with the orifices 8 for the discharge of the emulsion at normal speed, and the external chamber C_c separated from the first by the holes $t\ t'\ t''$ etc. . . of the diffusing tube and communicating with the admission orifice a' of the air for the emulsion, so that at normal speed the suction or vacuum in the external chamber C_c is less than in the internal chamber C_p.

The three calibrated plugs G_r or reduced speed calibrated plug, G_c or slow-speed calibrated plug, and G_p or normal calibrated plug, are disposed in the bottom of the float chamber. The calibrated plug G_r communicates directly with the reduced speed nozzle 1 by means of the duct 9 (Fig. 2). The calibrated plug G_p communicates through the duct 10 (and optionally through the chamber C'_p disposed between 2 and 3) with the internal chamber C_p (Fig. 3). The calibrated plug G_c communicates through the duct 11 with the external chamber C_c (Fig. 4).

The throttle valve is mounted on the axle 13 and has a special shape which is obtained by the pressing process. On the side at which it cooperates with the tube 7 extending the reduced speed nozzle, it comprises a bent part 14 which is adapted to the inclination of the tube 7 and forms a slot or trough 15 in which the tube 7 is disposed in the closed position of the throttle valve. The edge 14′ of the throttle which controls the action of the suction or vacuum upon the reduced speed nozzle is situated above the principal plane x—x of the said valve. Since the valve opens according to the arrow f (Fig. 3), the device is more rapidly opened at the point 14′ than at the opposite point 16 and on the remainder of the periphery of the valve. When the valve begins to open, the cross section opened at 14′ through which the engine suction acts will increase more rapidly than the cross section on the remainder of the periphery of the valve (and chiefly in the part which is diametrically opposite the point 16) through which the principal supply of air is withdrawn through the said valve. In this manner the output of the reduced speed calibrated plug will be increased before the normal speed orifices 8 commence to act, and the "passing point," that is, the bend in the curve of the output, between the reduced speed functioning and the normal functioning, will thus be eliminated. The great importance of this special form of the throttle valve will be thus observed.

I may also invert the arrangement, as shown for example in Fig. 7, and herein, instead of disposing the point 14′ above the principal plane x—x of the valve, the said point is placed below the same, and the valve opens in the other direction as shown by the arrow f.

As shown in Figs. 2, 3 and 4, I give to the part of the valve which is diametrically opposite the point 14′, a certain pressed shape in order to form a small groove or slot cooperating with the tube 7 in the full open position (Fig. 5). The edge 14′ is however still higher than the opposite part 16, and the same effect is produced.

The operation is as follows:

In the reduced speed position (Fig. 2) the outer discharge end of the reduced speed tube 7 is inclosed between a member 18 secured to the suction conduit, and the part 14 of the throttle valve, thus opening by means of the small flow section 14′ (slot 14″ Fig. 5). The secondary air supplied through the conduit 19 regulated by a screw 20 (Fig. 5) is mingled with the emulsion supplied through 7, so that the engine will rotate at slow speed. When the valve commences to open, the discharge from the reduced speed sprayer will be increased, as above specified, and this assures the continuity at the passing point, in normal operation.

When the said valve is opened (Figs. 3 and 4) the suction acts upon the orifices 8 and is transmitted in the first place to the internal chamber C_p—C'_p, and it proceeds thence through the holes such as $t\ t'\ t''$ to the external C_c, in which the suction is thus reduced. The slow speed calibrated plug G_c which serves to assure through the chamber C_c the lateral supply of the chamber C_p through the spaced holes such as $t\ t'\ t''$ will thus act chiefly by the height of the liquid in the float chamber above the said holes. At the slow speed rate (Fig. 3) and also at the high speed rate (Fig. 4), the air correcting the emulsion is supplied by the chamber C_a to which the air is delivered through a under the control of suitable means such as a cock (Fig. 4) or an automatic valve (Fig. 3).

Fig. 6 shows the invention as applied to a carburetor of the type specified in my patent application Sr. No. 755,296 of the 11th of December 1924 which matured to Patent 1,761,007 granted January 3, 1930 comprising a nozzle device mounted on a removable connecting member J disposed between the float chamber and the main body of the carburetor.

The operation is essentially the same as before, but herein the three sprayers are otherwise disposed. The reduced speed calibrated plug G_r is disposed outside the float chamber and is supplied by a channel 21 opening at a point above the bottom of the said

chamber. The lateral calibrated plug G_e remains at the bottom of the chamber, or is mounted in a boss 22 in the bottom of said chamber, and as before, it is connected by a conduit 11 with the emulsion chamber C_c. The normal speed calibrated plug G_p is mounted on a tube 23 which traverses the cover of the float chamber and is screwed at 24 into the boss 22. The internal duct 25 of said tube supplies the primary air of the emulsion, and the section of the atmospheric communication may be modified by the substitution of other members for the calibrated member 26.

Fig. 7 shows a modification of a carburetor of the said removable type. Herein the three sprayers are mounted on the nozzle device itself, so that the connecting member J comprises only a single duct 27 for the supply of the fuel to the said sprayers. The internal guard tube 2 is eliminated, and the members 28—29 carry the different concentric tubes of the nozzle device. The said members are screwed together at 30 and carry the several sprayers in a direct manner, being pierced with the necessary ducts connecting said sprayers with the nozzles of the corresponding annular chambers. It will be observed that in said modification the valve is inverted, and that the nozzle device is surrounded by an air corrector under manual control.

Figs. 8 to 9 show my invention applied to a horizontal carburetor. The reduced speed calibrated plug G_r supplies fuel to a separate emulsion tube 1 which receives the primary air for the emulsion through the tube 6 and the secondary air in an adjustable manner through the channel 31 provided with the regulating screw 32. The said tube delivers its emulsion through the orifices 33 and the channel 34 to a nozzle 35, extended by a flexible tube, 36 cooperating with the valve 12 in the completely closed position of the valve. The emulsion proceeds forwardly of the valve through a small branch 37 adjustable by a screw 38. The normal calibrated plug G_p is connected through the tube 39 and its orifices 40 with the chamber C_p which is directly connected with the annular chamber H (Fig. 8) which communicates through the orifices 8 with the suction conduit.

The slow speed calibrated plug G_c communicates with the annular chamber C_c which is formed between the diffusing tube 3 and the walls 41 of the space provided in the main body of the carburetor. The said sprayer also supplies the suction chamber H, but through the orifices $t\ t'\ t''$ of the diffusing tube. If it is desired to deliver air or other fluid to correct the emulsion, this can be done either through the conduit 42 after removing the plug 43, or through the conduit 44 (at the top of the chamber C_p) after removing the plug 45 and changing it to a plug with inlet tube *a* shown in Fig. 8. The tube supplying the air or other correcting fluid may be regulated by a cock, an automatic valve or the like (Figs. 3 and 4).

Figs. 10 to 15 show another construction in which the members G_r G_c and G_p, respectively carrying the calibrated plugs 61—62—63, are mounted in the respective bosses R—C—P formed in the main body of the carburetor. The bosses R—P are laterally disposed on either side of the float chamber, and the boss C is below. Each boss is pierced with a respective channel 9—10—11, leading respectively to the lower end of the reduced speed nozzle 1 and to the lower part of each of the chambers C_p or C_c. The members G_r—G_p—C_c carrying the calibrated plugs are screwed into the corresponding bosses, being thus readily inspected and removed through the head which extends outwardly. Beyond the head, these members are reduced in diameter, thus leaving around them an annular space 64—65—66 communicating with the float chamber through the respective conduits 67—68—69, and having at the ends the spaces 70—71—72 at whose ends are screwed the calibrated plugs 61—62—63.

When in position, the said calibrated plugs will form at the front part the corresponding annular spaces 64—65—66, thus preventing all direct connection between said spaces and the channels 9—10—11. The connection is made rearwardly of the calibrated plugs by the lateral holes 73—74—75 formed in the respective members G_r—G_p—G_c.

This apparatus has no effect upon the functioning of the carburetor, which is the same as above specified.

According to a modification which can be employed irrespectively of the position of the calibrated plugs, I supply the reduced speed calibrated plug by another calibrated plug, and I may thus supply the normal calibrated plug by the slow speed calibrated plug.

Fig. 13 shows by way of example an arrangement of this kind in which the reduced speed calibrated plug 61 is supplied in series with the slow speed calibrated plug 63, that is, the liquid fuel for the calibrated plug 61 has already traversed the calibrated plug 63. Herein the channel 67 is replaced by the channel 67_a which connects the forward end of the slow speed calibrated plug 63, that is, the chamber C_c, with the rear end of the reduced speed calibrated plug, through the lateral orifice 73.

The said invention is not limited to the constructions herein described and represented which are given solely by way of example, and for instance the said calibrated plugs may be disposed in any other manner, so that the members carrying the same will be accessible from the outside of the float chamber.

I claim:

1. In a carburetor comprising in combina-

tion three calibrated plugs the first for reduced speed and running light, the second for normal speed on level and the third for slow-speed on up-grades, an emulsion forming chamber fed by said normal speed calibrated plug and provided with direct output orifices towards the engine, another emulsion forming chamber fed by said calibrated plug for up-grades, a narrow passage between said two chambers whereby the second emulsion chamber and consequently the calibrated plug for up-grades will be subjected to a less suction than the first chamber and the calibrated plug on level, said two chambers supplying each emulsion towards the engine through the same output orifices.

2. In a carburetor comprising in combination three calibrated plugs the first for reduced speed and running light, the second for normal speed on level and the third for slow-speed on up-grades, an emulsion forming chamber fed by said normal speed calibrated plug provided with output orifices towards the engine, and said chamber being bounded by a tube provided with holes for the supply of air and in direct connection with said output orifices towards the engine, another emulsion forming chamber fed by said calibrated plug for up-grades and bounded by an outer tube concentric to the first, and a narrow passage between said two chambers.

3. In a carburetor with throttle valve comprising in combination three calibrated plugs the first for reduced speed, the second for normal speed and running light on level and the third for slow-speed on up-grades, an emulsion forming chamber fed by said normal speed calibrated plug and provided with direct output orifices towards the engine, another emulsion forming chamber fed by said calibrated plug for up-grades, a narrow passage between said two chambers, a central nozzle fed by said calibrated plug for reduced speed, a tube lengthening said central nozzle and extending nearly to the opening edge of the throttle valve, the part of the said valve cooperating with said tube being bent in such manner that its edge, adjacent the reduced speed nozzle, will be offset with reference to the main plane of the valve, whereby the aperture of the valve on the side next the reduced speed nozzle will open more rapidly than on the opposite side and on the remainder of the periphery.

4. In a carburetor with throttle valve comprising in combination three calibrated plugs the first for reduced speed, the second for normal speed and running light on level and the third for slow-speed on up-grades, an emulsion forming chamber fed by said normal speed calibrated plug and provided with direct output orifices towards the engine, another emulsion forming chamber fed by said calibrated plug for up-grades, a narrow passage between said two chambers, a central nozzle fed by said calibrated plug for reduced speed, a tube lengthening said central nozzle and extending nearly to the opening edge of the throttle valve, the part of the said valve cooperating with said tube being bent in such manner that its edge, adjacent the reduced speed nozzle will be offset with reference to the main plane of the valve, said tube being rigid and curved, opening near the wall of the engine section conduit and being situated, in the closed position of the valve, in a slot formed in the latter.

5. In a carburetor for an internal combustion engine, the combination, with fuel supply means, of three calibrated plugs, the first for reduced speed, the second for normal speed on level, and the third for slow speed on up-grades, a central nozzle fed by said calibrated plug for reduced speed, a perforated diffusing tube surrounding said central nozzle so as to form an emulsion chamber, output orifices being directed toward the engine from said emulsion chamber, a feed pipe connecting said normal speed calibrated plug to said emulsion chamber, and a tube concentric with said perforated tube forming an emulsion chamber which is fed by the calibrated plug for up-grades.

In testimony whereof I have signed this specification.

CHARLES HENRI CLAUDEL.