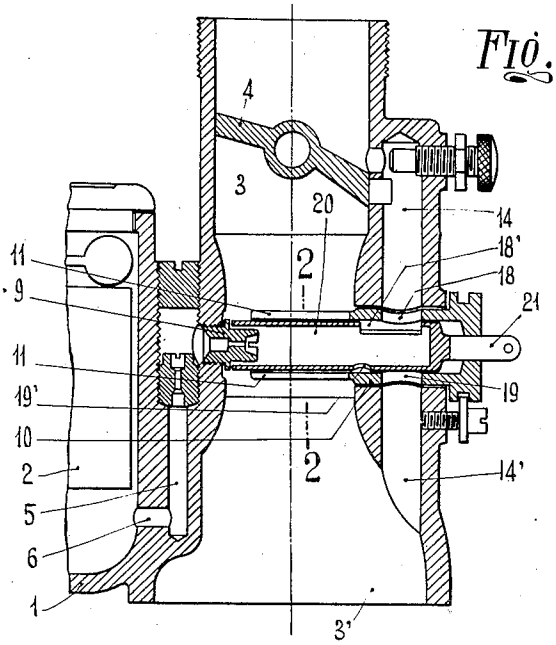
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CARBURETOR

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FIG. 1



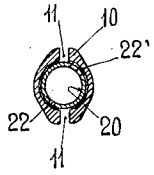


FIG. 2

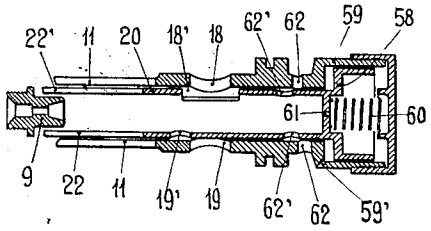
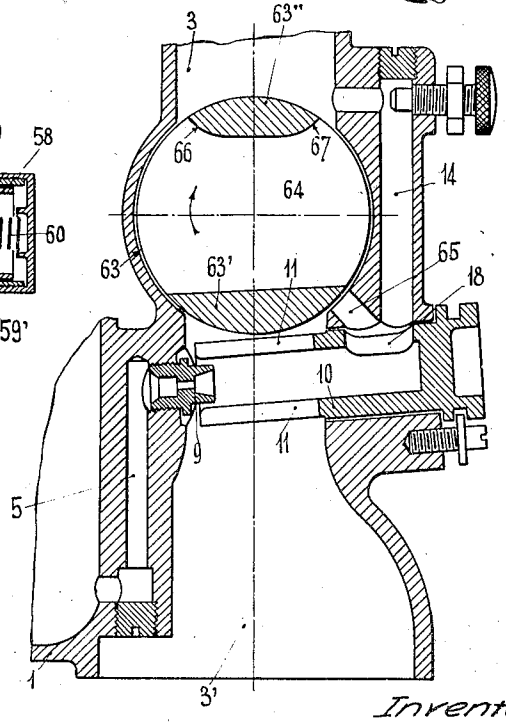


FIG. 3

FIG. 4



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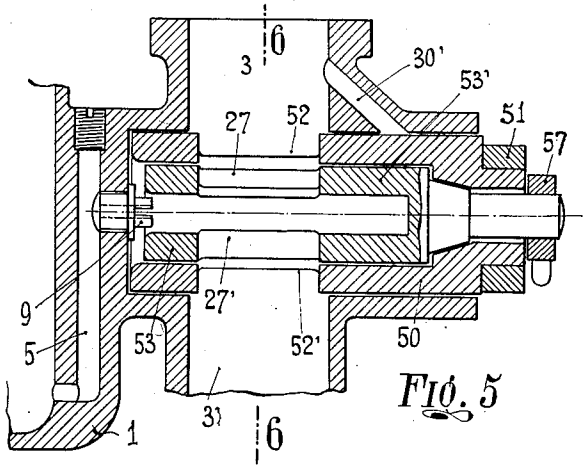


FIG. 5

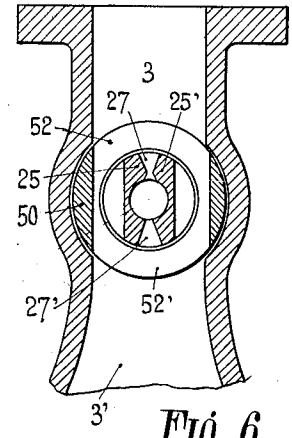


FIG. 6

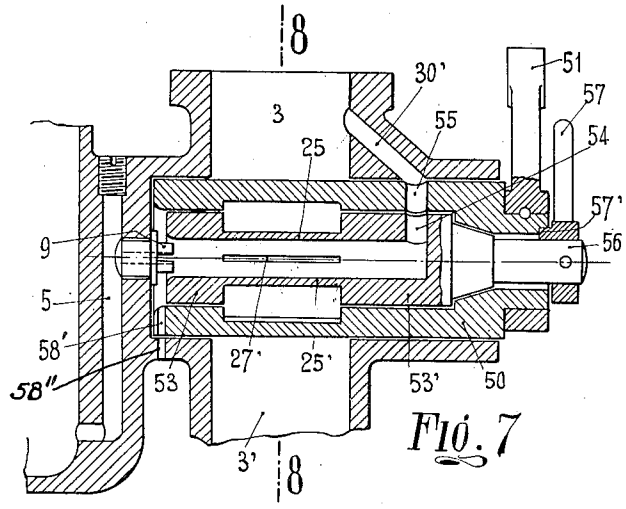


FIG. 7

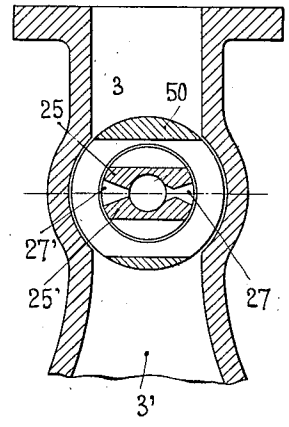


FIG. 8

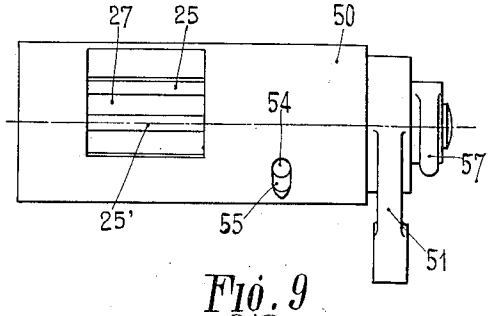


FIG. 9

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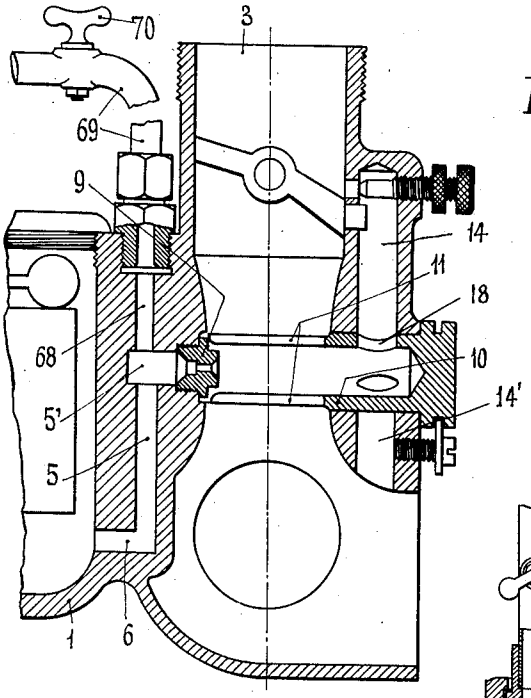


FIG. 10

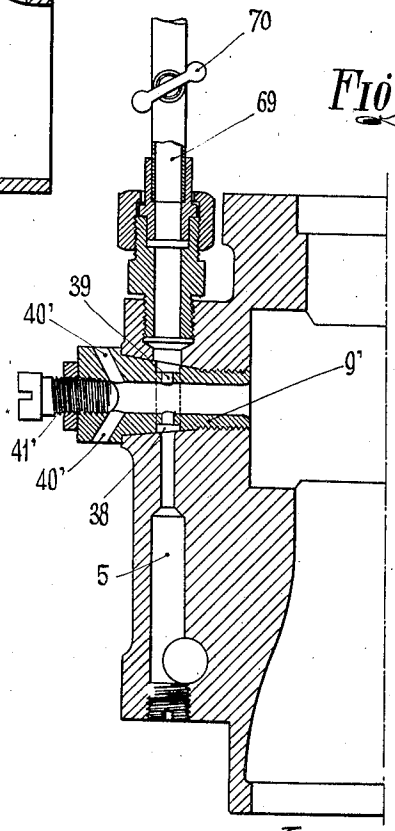


FIG. 11

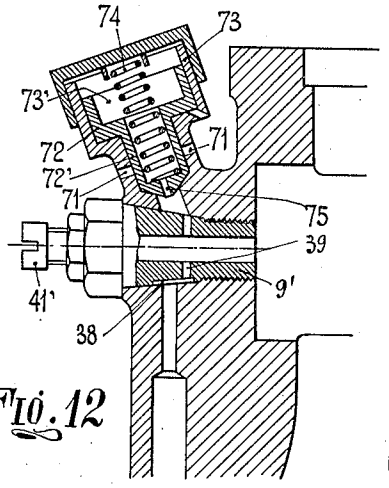


FIG. 12

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed February 13, 1924, Serial No. 692,590, and in Italy February 15, 1923.

The present invention relates to carburetors for internal combustion engines, and has for its object a carburetor comprising means for adjusting the supply of fuel and the composition of its mixture with air, as well as means for controlling the supply of said mixture to the engine.

On the annexed drawings are shown some embodiments of the present invention, and

Figure 1 is a central section of a carburetor according to the present invention;

Figure 2 is a transverse section on line 2—2 of Figure 1 of the adjusting member of said carburetor removed from the carburetor body;

Figure 3 is the longitudinal section of a modified construction of said adjusting member removed from the carburetor body;

Figure 4 is a central section of a construction of carburetor having a barrel throttle for adjusting the flow of mixture to the engine suction duct;

Figure 5 is a vertical fragmentary section on an enlarged scale of a construction of carburetor comprising a barrel throttle and a hollow air and fuel adjusting member arranged within said barrel throttle, said barrel throttle and adjusting member being shown in their open position that is in their position corresponding to the carburetor operation;

Figure 6 is a vertical transverse section on line 6—6 of Fig. 5;

Figure 7 is a vertical section similar to Figure 5 with said barrel throttle and adjusting member in closed position;

Figure 8 is a transverse vertical section on line 8—8 of Figure 7;

Figure 9 is a side view of the whole of said barrel throttle and adjusting member separated from the carburetor;

Figure 10 is a vertical section of a further construction of said carburetor provided with an air vent for the fuel nozzle;

Figure 11 is a fragmentary section similar to Figure 10 and on enlarged scale showing a modified arrangement of air vent;

Figure 12 is a detail section showing an automatic valve for the admission of air to the fuel duct.

The carburetor comprises a constant level tank 1 having a float 2 and communicating through a port 6 with a duct 5 which leads to a nozzle 9 arranged in the wall of the carbureting chamber 3; concentric with said nozzle 9 in the carburetor body is mounted to rotate a hollow adjusting member hereinafter described which extends across the said carbureting chamber 3 and leaves free spaces between its sides and the adjacent walls of the said chamber. The carbureting chamber 3 leads to the engine intake and has an air intake 3'.

In the construction shown in Figure 1 said hollow adjusting member comprises a sleeve 10 whose portion extending across the carbureting chamber 3 is provided with diametrically opposite slots 11; in said sleeve 10 further ports 18 and 19 are provided, which are adapted to register respectively with the orifice of an auxiliary carbureting chamber 14 and with the mouth of an air inlet 14'. Said auxiliary carbureting chamber 14 opens beyond the throttle valve 4, and said air inlet 14' opens in the air intake 3'.

The said sleeve 10 has longitudinal ribs or enlarged portions along or at the sides of slots 11, as shown in Fig. 2.

In said sleeve 10 is located a hollow plug 20 having opposite longitudinal slots 22 and 22' (see Figure 2) of which the slot 22 has a larger width than slot 22'; said plug 20 has also ports 18' and 19' adapted to register to an adjustable extent with ports 18 and 19 of the sleeve 10, and the port 18' is more elongated than port 19' in the direction of the plug axis.

The plug 20 may be rotated around its axis in order to adjust the free passage through slots 11 and to shut the same, and it may also be moved longitudinally by suitable means, not shown, connected with its stem 21.

In Figures 1 and 2 the slots 11 are shut and air is prevented from flowing around the nozzle 9, while port 18 is open to put the hollow of plug 20 in communication with the auxiliary carbureting chamber 14.

At the time of starting the engine the parts are in the position shown in Fig. 1 and under these conditions the suction produced by the engine acts on the nozzle 9 through auxiliary

carbureting chamber 14 and ports 18 and 18′ to produce a very rich mixture, as required at the time of starting the engine, because the air supply is restricted to the small intake 14′; after the engine has started the plug 20 is shifted longitudinally towards right, as viewed in Figure 1, and a larger and larger passage is provided for air around the nozzle 9 while the suction is correspondingly reduced at the mouth of the nozzle 9, and finally by rotating the plug 20 around its axis to clear slots 11, the carburetor is carried in conditions for normal operation in which air flows from intake 3′ to the engine suction duct through bottom slot 11, slots 22—22′ and top slot 11 and draws fuel from nozzle 9 while a further portion of air flows from air intake 3′ to said engine intake through the spaces intermediate the sides of said sleeve 10 and the carburetor body walls.

When the plug 20 from its left end position, as viewed in Figure 1, is brought in the opposite position, its port 19′ registers with port 19 of the sleeve 10 and thus it opens a further passage for supply of air to the engine intake through passage 14′ and auxiliary carbureting chamber 14.

In the modified construction of this invention illustrated in Figure 3, the plug 20 is provided with means adapted to shift it automatically in the direction of its axis under the action of the depression produced by the engine suction; said means comprise a hollow piston 58 solid with said plug 20 and having a larger diameter than the same, and said piston 58 is mounted to reciprocate in a cylinder 59 with a spring 60 acting to move it towards the nozzle 9; said cylinder has a vent 59′. The space enclosed in cylinder 59 and hollow piston 58 is in communication through a port 61 with the hollow of the plug 20; therefore when suction is increasing within plug 20, this suction acts on the right face of the piston 58 which has a larger area than the end face of plug 20 where the port 61 is provided, and then the atmospherical pressure acting on said piston 58 through cylinder vent 59′ causes said plug 20 to move towards the right and to open a larger passage for air around the nozzle 9 and through ports 19—19′.

On the contrary when the depression produced by the engine is very low, the action of the spring 60 is prevailing and said spring moves the plug 20 to its left end position as shown in Figure 1.

The sleeve 10 may be provided with further ports 62 opening in the atmosphere or in a duct leading to atmosphere, and ports 62′ of plug 20 are intended to register with said ports 62 when the plug 20 is in its fully open position, to increast the air admission.

The above described slotted plug is intended to control the composition of the mixture and it may be embodied in modified forms with respect to that of member 20 illustrated in Figures 1, 2 and 3.

In the embodiment of Figure 4 it consists of a barrel throttle 63 having a slot 64 perpendicular to its axis and adapted to rotate in a seat provided in the carbureting chamber 3 with its axis perpendicular to the plane in which lie the axes of chamber 3 and sleeve 10.

A further passage 65 opens in the seat of throttle 63, said passage leading to the port 18 of the sleeve 10; the size of the slot 64 is such as both slot 11 of the sleeve 10 and passage 65 may open at the same time in said slot, while one side 63′ of said throttle may close both said slot and passage.

In the construction illustrated the side 63″ of the thottle 63 which is farthest from the sleeve 10 in the closed position of said throttle, has rounded edges as shown by 66 and 67; said side 63″ of the throttle 63 could also be omitted.

In the conditions shown by Figure 4, the communication of the main carbureting chamber 3 with the air intake 3′ is closed and the engine suction acts only in the auxiliary chamber 14; the chamber 3 and engine intake are supplied with the mixture produced by fuel sprayed through the nozzle 9 and air flowing through bottom slot 11, sleeve 10, port 18 and auxiliary carbureting chamber 14.

On the throttle 63 being rotated in the direction of the arrow, the passage 65 is opened and the intercommunication of chamber 3 and slot 64 is produced along the edge 66 of the throttle side 63″, the engine suction being thus caused to act mainly on the orifice of the passage 65.

At the time, in the throttle rotation, the edge of the side 63′ of the throttle 63 goes beyond the orifice of the passage 65, the main carbureting chamber 3 is progressively put in operation and air is admitted thereto around sleeve 10 and through slot 11 of the same, the portion of the upper slot 11 left clear by throttle side 63′ increasing to the same extent as a larger portion of slot 64 of throttle 63 is carried in front of air intake 3′ by the described actuation of said throttle 63.

The amount of mixture entering the carbureting chamber 3 through the upper slot 11 of the sleeve 10 may thus be adjusted.

In the construction of Figures 5–9, the controlling member consists of a rotatable barrel 50 having an operating lever 51 and mounted to rotate concentrically with the nozzle 9; said barrel has two ports 52—52′ adapted to open to an adjustable extent into chamber 3 and air intake 3′ to control the intercommunication of the same.

In the barrel throttle 50 is mounted to rotate a hollow plug 53 which is concentric with nozzle 9, is flattened on opposite sides 25—25′ leaving two opposite slots 27—27′.

The space within said hollow plug 53 extends in a trunnion 53′ where is provided a radial port 54 adapted to register with a port 55 of the barrel throttle 50. This barrel throttle can be rotated to carry said port 55 in register with a passage 30′ supplying mixture to carburetor chamber 3 when the idle running of the engine is desired (Figure 7). The hollow plug 53 has a stem 56 projecting beyond the barrel throttle 50 and its position may be modified with respect to said barrel throttle by means of a lever 57; the hub of this lever 57 has a projection 57′ (Fig. 7) engaging with the hub of lever 51 of the barrel throttle 50.

A port 58′ of the barrel throttle 50 opens in the space within the hollow plug 53 and preferably near the portion of the nozzle 9 fastened in the carburetor body, and said port 58′ leads to atmosphere through a port 58″ of the barrel throttle seat. These ports are intended to admit a proper amount of air for producing a mixture adapted for the engine idle running when the barrel throttle 50 is in closed position.

When the barrel throttle 50 is in closed position, as shown by Figures 7 and 8, the port 55 is in register with the passage 30′ and thus the engine suction acts in the space within the hollow plug 53 where the fuel supplied by the nozzle 9 produces a mixture with air entering through ports 58—58′.

When the carburetor is in the above described operative conditions, the engine is idling and its run may be controlled by adjusting the air supply through port 58.

When the barrel throttle 50 is manipulated to open passages 52—52′, the engine suction produces an air stream through said passages and the space of plug 53.

The mixture is produced in said space which receives a fuel spray from the nozzle 9 and an air supply from the slot 27; a rich mixture is thus produced which issues through slot 27 and mixes with air flowing around the sides 25—25′ of hollow plug 53.

By adjusting the position of plug 53 with respect to the barrel throttle 50 it is possible to alter within large ranges the conditions of operation of the carburetor during the running of the engine, because the size of the passages left free along its flattened sides for the air flow and therefore the air throttling, and the supply of air through slot 27′ into space 26 for admixture with fuel, depend upon the angular respective positions of said plug 53 and barrel throttle 50.

By the described arrangement it is possible to have the largest supply of mixture to the engine suction duct for a given position of the barrel throttle, say when said barrel throttle begins to be opened; for such a purpose it is only necessary that the respective position of the plug 53 and barrel throttle 50 be such as the plug 53 has its slots 27—27′ in alignment with the axis of carbureting chamber when the barrel throttle is about to open way to said carbureting chamber; in fact in such a position of the plug 53 the air stream through space 26 and suction on nozzle 9 are very large and these conditions are operative as soon as the barrel throttle is being opened.

In other positions of said plug the conditions of admixture are altered because the flow of air into the space 26 and through the passages around said plug are restricted.

In the described construction the general operation of the carburetor is controlled by rotating the barrel throttle 50, which acts as a throttle valve, while the carbureting conditions when the barrel throttle is open are adjusted by modifying the position of plug 53 with respect to the barrel throttle 50.

Figures 10 and 11 show an arrangement for controlling the fuel supply; in said arrangement the space entered by the fuel before it passes to the nozzle is able to be put in communication with atmosphere through an adjustable opening.

The construction of Figure 10 comprises a chamber 5′ connected with the fuel supply duct 5 and nozzle 9, and said chamber 5′ is also in communication with a passage 68 leading to the atmosphere through a pipe 69 provided with a cock 70 or another controlling member.

In the construction of Figure 11 the fuel supply duct 5 opens in a groove 38 leading through ports 39 to the bore of a nozzle 9′ and said nozzle 9′ is passed through longitudinally by air entering through further ports 40′ adapted to be adjusted by a screw 41′.

In this construction the groove 38 passed through by the fuel flowing to the nozzle 9′ is connected with the atmosphere through a passage 69 provided with an adjusting cock 70.

In both constructions it is possible to admit air into said passage 69 above the nozzle by means of cock 70 or of a similar member adapted to be operated by hand or by a governor.

The air admission at the top of the duct 5 acts to reduce the supply of fuel to the nozzle, or to cause said supply to fail by removing the action of the engine suction on the fuel.

When the passage 69 is entirely open the fuel supply to the carburetor is entirely cut off, and in intermediate positions of said cock between fully open and fully closed positions the fuel supply to carburetor has different values.

The above described arrangement provides for adjusting or cutting off the fuel supply.

The adjusting member which is shown in the form of a cock in Figures 10 and 11, may also be a self-operating member as shown in Figure 12, where the communication of the groove 38 with atmosphere is provided

through ports 71 controlled by a valve 72' which is carried by a piston 72 located in a vented cylinder 73 and actuated by a spring 74. The piston 72 and valve 72' are hollow and the cylinder 73 is closed to provide in cooperation with the piston a chamber 73' connected with the groove 38 through a port 75.

The depression produced by the engine suction is caused to act in said chamber 73' through port 75 and when it exceeds a predetermined value, the piston 72 is moved by action of the atmospheric pressure to clear ports 71 to a more or less large extent.

In this construction the communication of groove 38 with outside is adjusted automatically according to requirements.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. A carburetor comprising a mixing chamber, a hollow plug mounted to rotate across said mixing chamber and having flattened sides, a fuel nozzle discharging into said hollow plug, said hollow plug having two opposite longitudinal slots opening between said flattened sides one of said slots being for admission of air into said hollow plug and the other one for issue of mixture of air and fuel produced in said hollow plug, a barrel throttle extending across said mixing chamber and having ports on its sides, means for rotating said hollow plug to adjust the air admission through the same and means for controlling said barrel throttle.

2. A carburetor comprising a main mixing chamber and an auxiliary mixing chamber, a hollow plug mounted to rotate across said mixing chamber and having flattened sides, a fuel nozzle discharging into said hollow plug, said hollow plug having two opposite longitudinal slots opening between said flattened sides one of said slots being for admission of air into said hollow plug and the other one for issue of mixture of air and fuel produced in said hollow plug, a barrel throttle extending across said mixing chamber and encircling said hollow plug and having ports in its sides, means for controlling said barrel throttle, said hollow plug and barrel throttle having each a port adapted to register with each other and with said auxiliary mixing chamber when said main mixing chamber is obstructed, and means for adjusting the position of said hollow plug within said barrel throttle.

In testimony whereof I have signed my name to this specification.

ENRICO FEROLDI.