Feb. 25, 1930. F. MONIER 1,748,305

CARBURETOR

Original Filed Oct. 31. 1922 2 Sheets-Sheet 1

Fig. 5

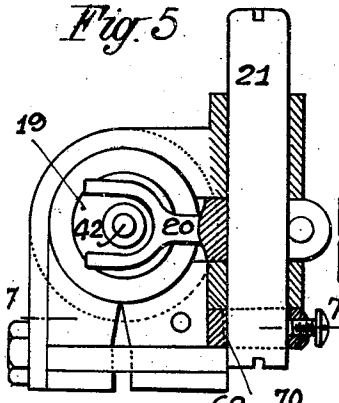

Fig. 4

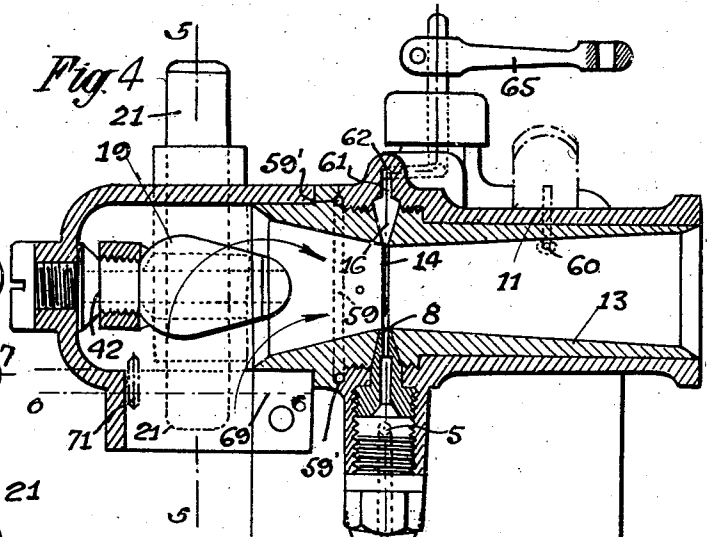

Fig. 7

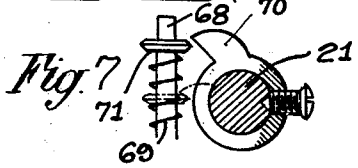

Fig. 6

Fig. 1

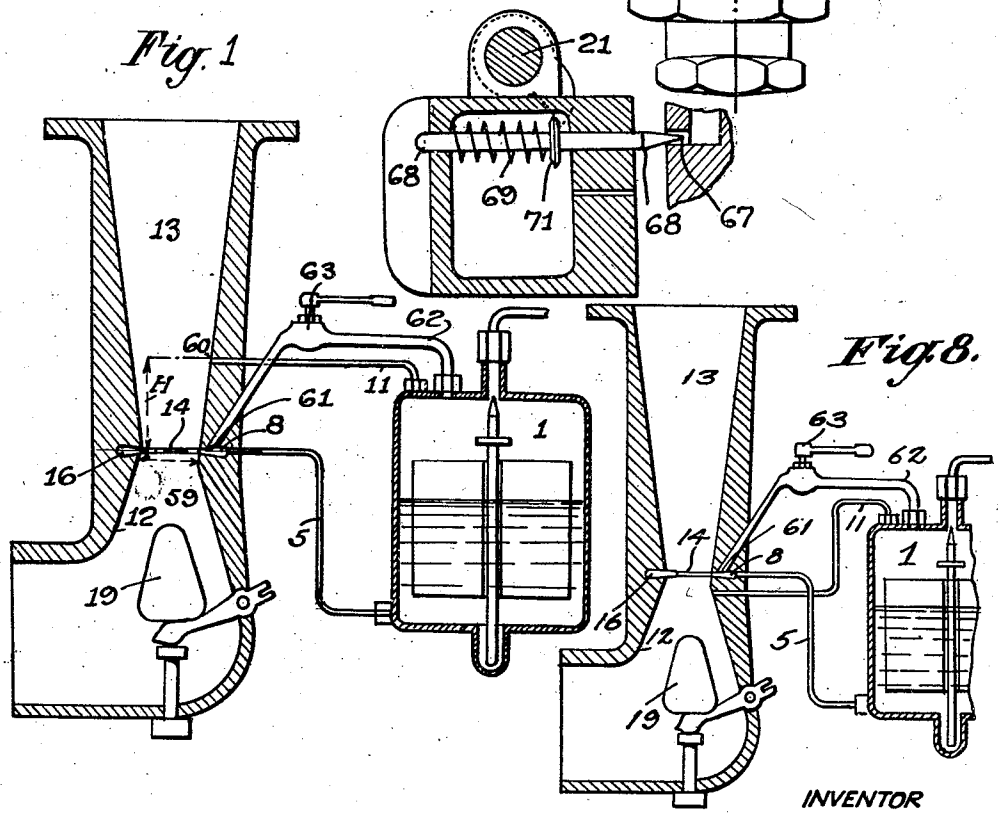

Fig. 8.

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Fig. 2

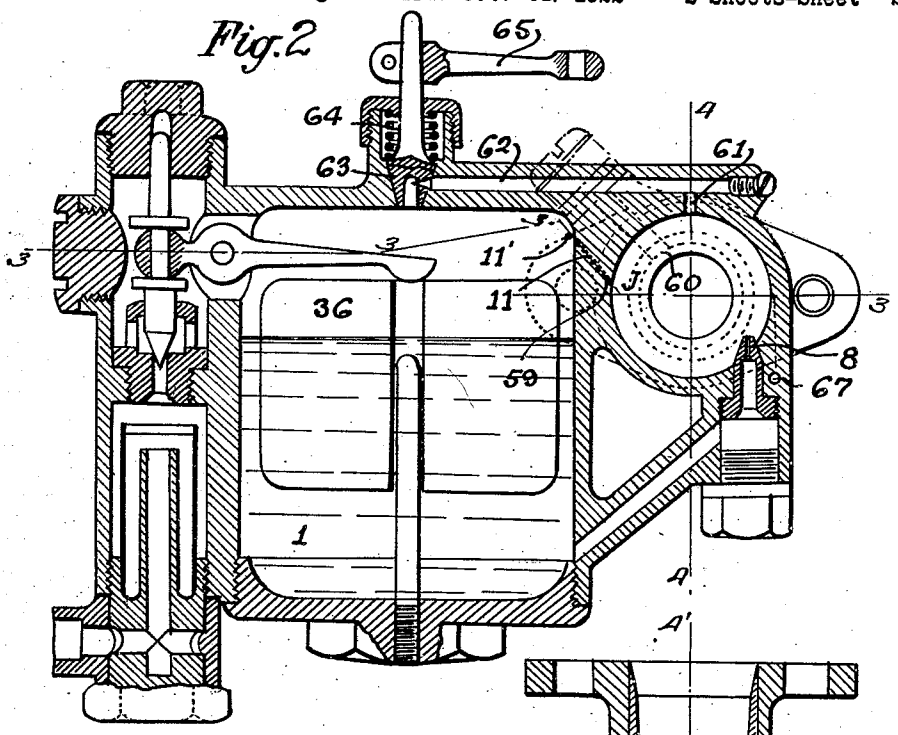
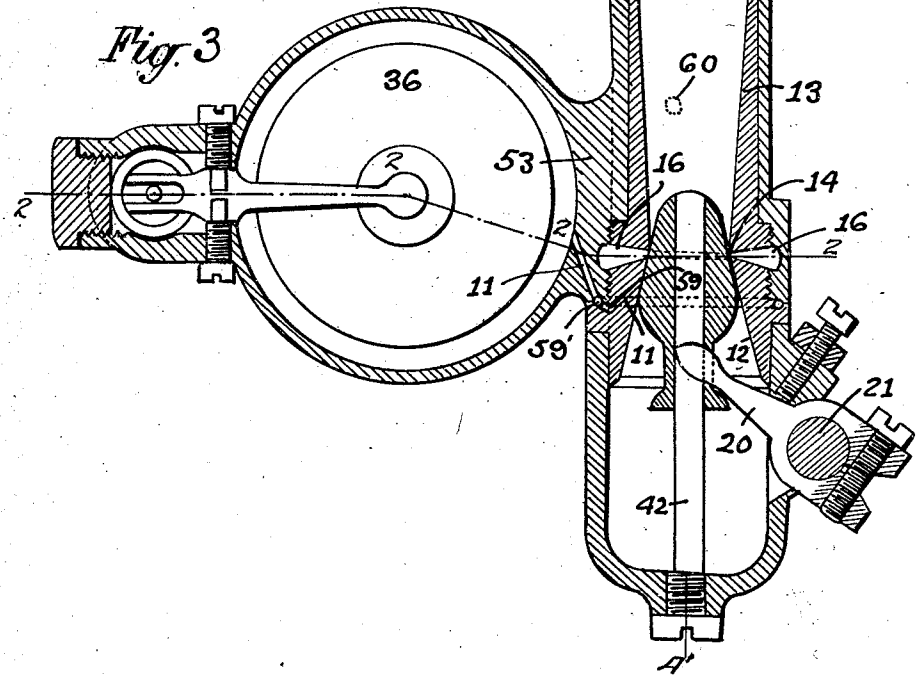


Fig. 3



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UNITED STATES PATENT OFFICE

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CARBURETOR

Original application filed October 31, 1922, Serial No. 598,084, and in France November 5, 1921. Divided and this application filed October 15, 1924. Serial No. 743,650.

My invention relates to carburetors and a method of regulating or correcting the action of the same described in my application for patent filed October 31, 1922, Serial No. 598,084, of which the present application is a division. In said prior application I have described a carburetor in which the amount of fuel, such as liquid hydrocarbon, fed through a suitable orifice or spray nozzle for mixture with air, depends upon differences of depression or suction at two nozzles or outlets opening into the suction tube or Venturi tube of the carburetor, one of said outlets being the spray nozzle and connected as usual with the body of the fuel held at constant level in a suitable sealed container, and the other opening at a different point or position in the said suction tube and connected with the closed space above the level of the liquid, said difference of depression or suction at said outlets being affected by or dependent upon the amount of suction exerted by the engine according to differences in the opening of the throttle and said difference of depression or suction increasing as the air flow or suction of the engine increases and vice versa.

The object of the present invention is to provide an adjustment or correction for different conditions affecting the carburation, such as temperature of air, quality of fuel and the like, to which end my invention consists essentially in regulating or adjusting the depression acting on the surface of the liquid by means of an additional or supplemental depression tube having an outlet into the suction tube at or near the spray nozzle or region of maximum depression and having preferably a larger cross-section than the differential depression element which acts upon the space above the liquid level and opens into the suction tube at a point removed from the point of maximum depression or location of the spray nozzle, the said additional tube being provided with a suitable device for regulating its flow section.

The said regulating device is more or less opened to produce a variation in the differential effect acting on the carburetor, and one may correct the output of the carburetor according to requirements, while the carburetor retains its automatic action for different speeds. The engine throttle is obviously placed between the air inlet and the fuel nozzle for differential depressions and corrections.

The differential depression element acting normally on the fuel surface is inserted either on the engine side of the region of maximum depression or on the farther side of the same. In other words it is applied in the diffuser or suction tube at a point between the restricted or narrow part of the same and either end thereof, or at both points the two being in the latter case connected together.

According to my present invention the said differential depression element if inserted or applied on the engine side of the narrow part or portion of maximum depression in the suction tube or diffuser, is located at a distance from said narrow part approximately equal to twice the diameter of said narrow part. If applied at the opposite or outward side of said narrow part it is preferably located at a distance from said narrow part approximately equal to the diameter thereof divided by π.

Another part of my invention relates to the means for momentarily adding fuel to the mixture when the throttle is opened to resume speed and consists essentially in the provision of a supplemental air inlet leading into a fuel chamber having a spray outlet, a supplemental needle valve controlling said air inlet and means connected with the throttle for actuating said needle valve, all as more particularly hereinafter described.

Fig. 1 illustrates in a diagrammatical fashion the principle of the present invention as embodied in a carburetor shown in vertical section.

Fig. 2 is a vertical section of a practical form of construction embodying the invention taken on the line 2—2—2—2 Fig. 3 and in which the suction or diffuser tube or conduit is disposed horizontally.

Fig. 3 is a horizontal section on the line 3—3—3—3 of Fig. 2.

Fig. 4 is a vertical section on the line 4—4 of Fig. 2 and on the line 4′—4′ of Fig. 3.

Fig. 5 is a vertical section on the line 5—5 of Fig. 4.

Fig. 6 is a partial section on the line 6—6 Fig. 4.

Fig. 7 is a horizontal section on the line 7—7 of Fig. 5.

Fig. 8 is a view similar to Fig. 1 showing a slight modification of my invention.

Referring to Fig. 1, the suction or Venturi tube of the carburetor is shown as consisting preferably of two flaring or funnel-shaped or conical sections 13 and 12 whose smaller ends are juxtaposed thus producing at said ends a restricted section in the suction tube and a region in which the depression produced by the suction of the engine is a maximum. The wide end of section 13 connects with the engine.

The anterior throttle is typified at 19 as a cone which works along the axis of the tube and serves to vary the size of the opening through which air is drawn by the engine suction. The liquid fuel is contained in tank or reservoir typified at 1, in which a constant level is maintained by the automatic action of a float or other means and the space above the liquid is normally sealed or closed. With said space a pipe or tube 11 connects and leads to an outlet in the suction tube for producing a variable depression on the surface of the liquid, while another tube 5 connects with the body of the liquid and feeds the same at an orifice 8 into a chamber 16 which has an outlet 14 into the suction tube operating as the spray nozzle.

By these means the varying difference of depression producing flow of fuel into the suction tube is obtained as described more particularly in my original application. Preferably the chamber 16 is an annular chamber in the wall of the suction tube and the spray nozzle 14 is a narrow annular outlet between the tube sections 12, 13.

According to my present invention the suction tube 11 communicating with the space above the fuel is inserted at 59 (into the Venturi tube) (Fig. 8) at a distance h from the narrow part of the diffuser 14 which is equal to the diameter of said narrow part divided by π. It might also be inserted at 60 (Fig. 1) at a distance H from the narrow part 14 of the diffuser which is equal to double the diameter of said narrow part. A second or supplemental depression element is connected with the closed space above the body of fuel and has its outlet 61 at the level of the narrow part of the diffuser or suction tube and opens into the chamber 16. The depression afforded by this second element is therefore greater than that afforded by the pipe 11. The element of which 61 is the outlet communicates with the space above the liquid in the float chamber 1 through a conduit 62 whose cross-section is greater than that of the depression conduit 11. On the conduit 62 is mounted a cock 63 controlling the effective area of the conduit 62. The correcting element comprising the depression element 61, conduit 62 and cock 63 has the following effect:

The depression in 61 is greater than in 59 (or 60), and for the above mentioned functions of 60 and 59, it is at least double. Upon the complete closing of the cock 63, the element 61 ceases to act. Upon opening said cock, the vacuum on the liquid fuel will increase with respect to the vacuum produced by the element 59 (or 60); the flow retarding depression acting on the carburant mass in the float chamber will thus increase, thereby reducing the feed to the nozzle. If said cock is fully opened the depression on the liquid surface will be equal to the depression exerted at its lower part by the nozzle 8 and the feed to the latter will be entirely cut off.

By reason of the location of the depression element at 59 as stated, the effect of depression upon said element will be maintained when the said valve or core 19 enters the converging cone of the diffuser. At this moment, in fact, due to the partial closing of the diffuser, only a small amount of air flows in the latter, so that the effect in the diverging part becomes very small. On the contrary, between the converging cone 12 of the diffuser and the core 19 the small quantity of air admitted has a high speed due to the diminution of the flow section. This speed of the air acts to maintain the dynamic effect on the element 59 at a high value; with suitable dimensions of the carburetor parts, this value could be maintained substantially constant irrespective of the amount to which the throttle 19 is closed.

Referring now to the practical form of construction shown in Figs. 2, 3, and 4, the elements as indicated in the greater part of the preceding figures will be recognized. The conduit connecting the depression element 59 with the float chamber 1 is formed in the converging cone 12 of the diffuser; it communicates by a circular groove 59′ with the second part of said conduit which is formed in the body of the carburetor. The conduit 62 connecting the depression part 61 of the correcting element with the float chamber passes through the cover of said chamber and is controlled by the cock 63 for permitting the depression in chamber 16 to be communicated to the upper part of the float chamber when the throttle valve 19 is in substantially closed position. The cock 63 has a tapered shape, being urged upon its seat by a spring 64 and controlled by a lever 65; it has a wedge-shaped recess providing for the gradual opening and closing of the conduit 62. The portion 60 of the depression element is shown in the form of a conduit

11, 11' ending at the top of the float chamber and indicated by dotted lines on Fig. 2.

In order to facilitate the resumption of speed, use is made of a compensating device composed of an air inlet 67 connected with the chamber 16 into which opens the nozzle 8. (Figs. 2, 4, 5, and 6). A needle valve 68 controls said inlet in connection with a spring 69. A toe 70 on the shaft 21 of the lever controlling the core 19 acts when the said core is lowered to open the needle 68 by bearing upon a shoulder 71 on the stem of the needle 68, Figs. 5, 6, and 7, thereby holding open the said compensating device 67. Upon closing the valve formed by the core 19, the toe 70 moves together with the said needle as impelled by the spring 69. The hole 67 of the compensating device is now closed and the chamber 16 may be partially filled with liquid fuel. Should the core 19 now be moved to open position, the hole 67 will also be opened, and the fuel in the chamber 16 can proceed into the diffuser, thus facilitating the resumption of speed by a momentary addition of fuel to the gas mixture.

The conical or flaring sections 12, 13 of the suction tube may be secured in position in the carburetor body 53 in the manner indicated in Figs. 3 and 4. The float of the float feed tank is indicated at 36. The conical valve 19 may work on a guide rod 42 and be actuated by a rock shaft 21 carrying an arm or arms 20 or may be guided and actuated in any other desired way.

What I claim as my invention is:—

1. In combination, an intake pipe provided with a restricted part, said restricted part producing an area of maximum depression upon air flow through said intake pipe, a control valve operatively positioned in said intake pipe in front of said restricted part, said valve cooperating with said restricted part to produce a rapid flow of air in said restricted part when said valve approaches closed position, a closed fuel reservoir, means for maintaining a substantially constant height of fuel therein, a fluid conductor connecting said reservoir beneath the normal fuel level therein with the restricted portion of said intake pipe, a second fluid conductor connecting the space above the normal fuel level in said reservoir with the intake pipe at a point of less than the maximum depression therein, a third fluid conductor connecting the space above the normal fuel level in said reservoir with the part of maximum depression in said intake pipe, and means for controlling the passage through said third conductor.

2. In combination, an intake pipe provided with a restricted part, said restricted part producing an area of maximum depression upon air flow through said intake pipe, a control valve operatively positioned in said intake pipe in front of said restricted part, said valve cooperating with said restricted part to produce a rapid flow of air in said restricted part when said valve approaches closed position, a closed fuel reservoir, means for maintaining a substantially constant height of fuel therein, a fuel conductor connecting said reservoir beneath the normal fuel level therein with the restricted portion of said intake pipe, a second fluid conductor connecting the space above the normal fuel level in said reservoir with the intake pipe at a point of less than the maximum depression therein, a third fluid conductor connecting the space above the normal fuel level in said reservoir with the part of maximum depression in said intake pipe, means for controlling the passage through said third conductor and means for controlling said valve.

Signed at Paris, France, this 3rd day of October, A. D. 1924.

FRANCIS MONIER.