

Sept. 1, 1931.

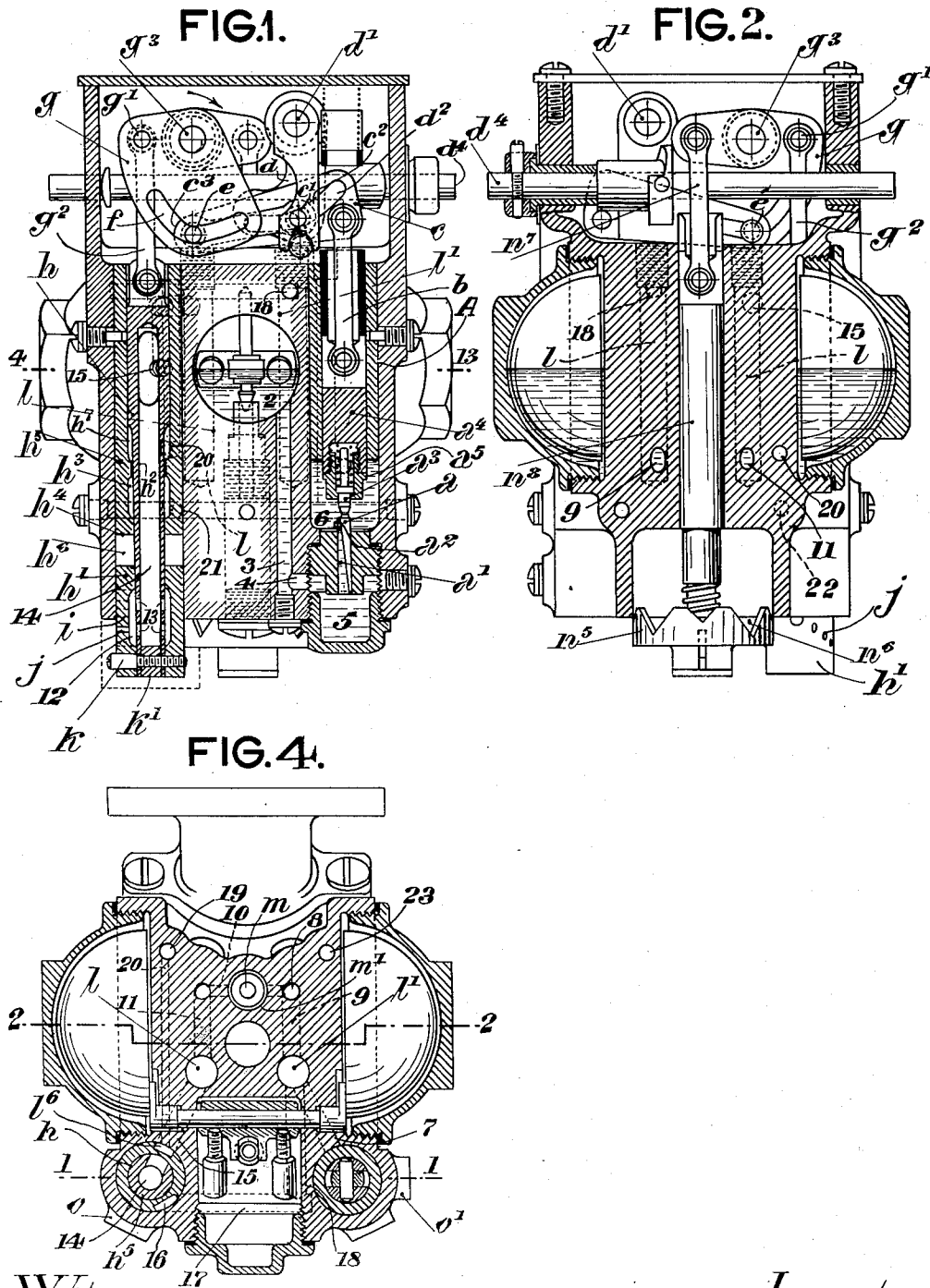
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1,821,909

CARBURETOR

Filed Dec. 11, 1923

3 Sheets-Sheet 1



Witnesses

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FIG.3.

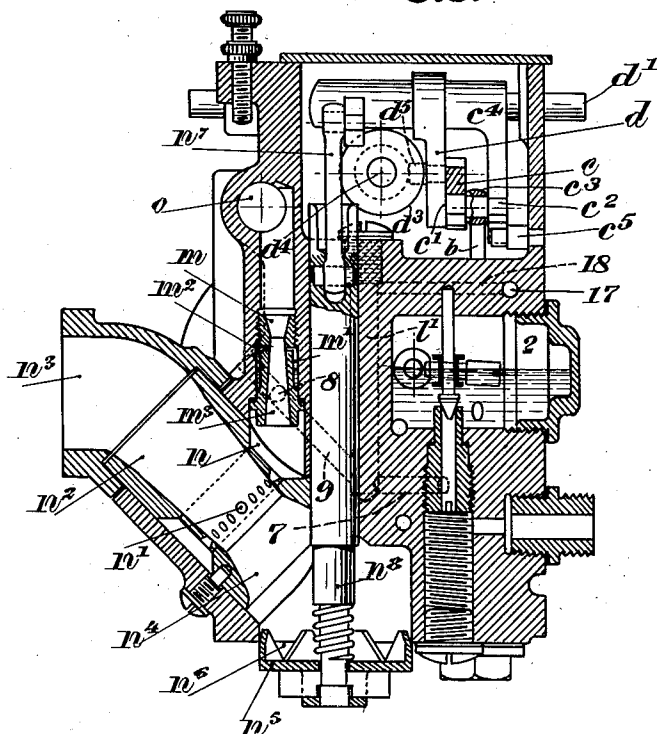
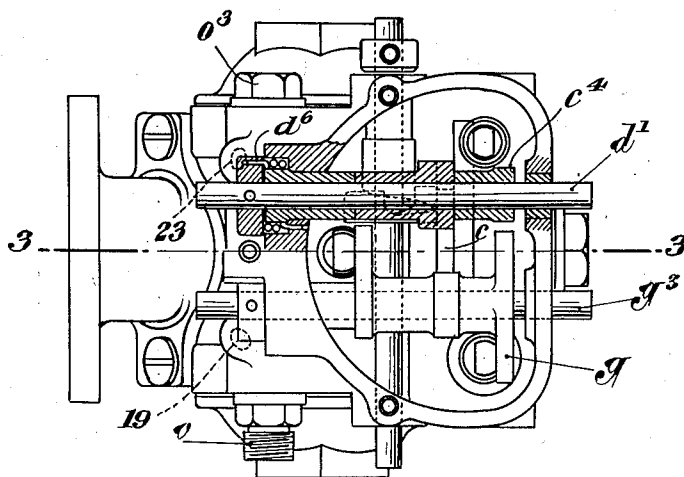


FIG.5.



Witnesses

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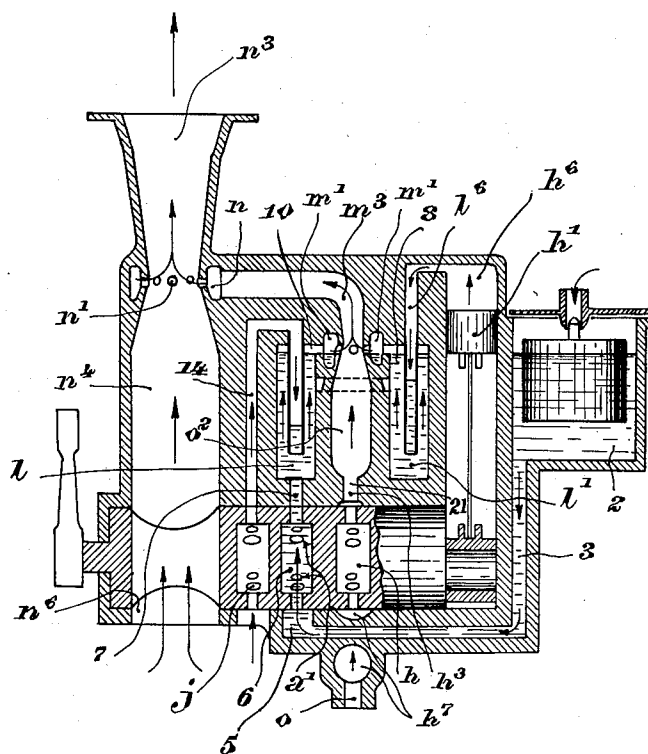
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Fig. 6.



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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed December 11, 1923, Serial No. 680,004, and in France December 12, 1922.

This invention relates to improvements in carburetors for internal combustion engines, of the type in which a control member operates three piston-actuated valves simultaneously, one for the fuel, one for the main air and one for the auxiliary air.

The invention consists in forming a carburetor working under the suction of the engine in which the size of the fuel inlet is controlled by a needle valve connected by a spring controlled sleeve to a piston and operated by a connecting rod pivoted to a lever having a floating fulcrum, the other end of which lever is adapted to be rocked by a plate on the control shaft, the position of the floating fulcrum being varied by a cam to vary the permissible stroke of the piston operating the needle valve.

The invention will be described with reference to the accompanying drawings.

Figure 1 is a vertical central section of a carburetor constructed in accordance with the invention.

Figure 2 is a similar section on a plane at right angles to that of Figure 1.

Figure 3 is a vertical section on line 3—3 of Figure 5.

Figure 4 is a horizontal section on line 4—4 of Figure 1.

Figure 5 is a plan view, partly in section of the same.

Figure 6 is a diagrammatic section showing all the passages and wells and also the normal level of fuel in the wells.

The carburetor is provided with a casing inside which is arranged a fuel reservoir and three pistons operated simultaneously for varying respectively the fuel supply and the air supplies. Fuel issuing from a constant level reservoir 2 flows down the passage 3 (Figure 1) through the port 4 to the well 5 in the base of a cylindrical casing for needle valve *a*. From the well 5 it passes up a duct *a*² into the chamber 6 whence it flows through a passage 7 to the well 1¹ (Figure 4).

From the well 1¹ the fuel flows through passages 9, 8, 10, 11 (shown by dotted lines in Figure 4) to the well 1.

As the needle valve *a* descends in the cylinder A, the conical shoulder *a*³ closes the passage *a*² and as the piston *a*⁴ raises the needle valve *a* the tapered end *a*¹ allows a greater inlet of fuel to the chamber 6.

The valve *a* is affixed to a piston *a*⁴ by a sleeve *a*⁵ having a spring *a*⁶ arranged to limit the pressure of the tapered end on its seat. This piston valve is operated by means of a connecting rod *b* which receives movement from a lever *c* having a floating fulcrum *c*¹ which is carried by an arm *d* on a shaft *d*¹, the connecting rod *b* being pivoted to the lever *c* by means of a pin. As the arm *d* is turned about its shaft *d*¹ the position of the fulcrum *c*¹ of the lever *c* is varied causing a variation in the amplitude of the movement of the piston *a*⁴ in the cylinder A. The partial rotation of the arm *d* is controlled by a pin *d*⁵ thereon bearing on a cam *d*³ on a shaft *d*⁴. A spring *d*⁶ (Figure 5) keeps the arm *d* pressed against the cam *d*³.

The other end *c*² of the lever *c* which can rock about the point *c*¹, carries a pin *e* working in a slot *f* in a member *g* which rocks with a shaft *g*³. The member *g* is formed with a projecting pin *g*¹ on which is pivoted one end of a connecting rod *g*² operating a vertical hollow piston *h* the lower end of which carries a sleeve *h*¹. The sleeve *h*¹ which is slidably fitted in a chamber or bore *i*, is affixed to the piston *h* by a pin *k* and the piston *h* is formed with ports 13 in communication with ports *j* in the sleeve *h*¹. The pin *k* also secures a plug *k*¹ which closes the lower end of the bore 14 of the piston *h*. The air entering through the ports *j* in the walls of the chamber 12 which is formed around the lower portion of the piston *h* and in sleeve *h*¹ (Figure 1) passes through the ports 13 into the bore 14 of the piston *h*.

which is in communication with the well 1 through ducts 15 (Figure 4).

It has been previously stated that the air may flow through the passages 10 and 11 because under the action of suction, the emulsion air entering through the openings j and then into the chamber 12 and from there through the small opening 13 into the bore 14 of piston h and then through passage 15 and well 1 commingles in this well with the fuel and forms an emulsion which in the form of gaseous bubbles rises through the passages 11 and 10 in the direction towards the member m .

As has been stated above, the passage 11 is filled with fuel owing to the arrangement of communicating tubes. In fact the said canal 11 rises or starts from a canal 10, the latter containing the fuel which flows from the well 1¹. Now in the canal 10 there must be a pressure lower than atmospheric pressure and hence in the well 1 the same pressure must prevail.

Consequently the air contained in the well 1 has a tendency to escape in the form of small exhaust bubbles to rise in the passage 11 and to arrive in the passage 10 where there is a partial vacuum. The piston h is conical for part of its length h^2 , thereby gradually blocking the passage h^3 (Figure 1).

The member m is connected with the well 1¹ through the horizontal passage 8 and through the inclined passage 9 which terminates at the base of the well 1¹. The member m is therefore connected with the lower part of the well 1¹. The upper part of this well communicates through the canal 18 and through a vertical groove in the wall of the part h with the tube 14. This tube is in communication with the atmosphere through small openings 13 located at the lower portion of the part h and terminating in the chamber 12, the wall of which has several small holes j in direct communication with the atmosphere.

The passage 8 draws the fuel from the well 1¹ to the nozzle m , and since the passage 10 is at the same level as the passage 8, the inclined passage 11 will be filled with fuel as well as the lower part of the well 1. This is due to the law of communicating tubes.

The purpose of the annular space h^3 and the internal collar which separates it from the annular space h^2 is to allow the pressure in the air passages which unite at m (Figure 3) to be varied. This air which may come directly from the outside or from a source of air to be heated variably and connected with the adjusting device o , Figure 5, flows down in the vertical passage 19. Then through the horizontal passage 20, Figure 4, it arrives in the chamber h^4 , Figure 1. It traverses the conical port h^3 , and this additional air is introduced through the horizontal passages 21, Figure 1, and 22, Figure 2, and vertical

passage 23, Figure 4, to flow into the passage o^2 closed by the stopper o^3 , Figure 5, and finally landing in the chamber or nozzle element m . A portion of the air entering through o is directly admitted to the nozzle m .

The upper face of the sleeve h^1 acts as a piston with respect to the base h^4 of the tube h^5 in which the piston h operates. The movement of the piston varying the volume of the chamber h^6 and the air which is present therein being compressed and forced up the vertical duct 16 (Figure 4) ducts 17 (Figures 3 and 4) and 18 (Figures 1 and 4) into the well 1¹ arranged in the passage of the mixture giving additional air for starting the engine.

The passages 19, 20 serve to place the chamber h^3 in communication with the atmospheric air, through canal 19. This passage starts from bushing o and the passage 20 terminates at 21 in the annular space h^3 . In this way atmospheric pressure is caused to prevail in the said space.

The valve n^5 is carried by the rod n^8 . This rod is connected with the bar n^7 which is pivotally fastened to the member g and this member is fixed to the shaft g^3 .

The chamber h^6 is a closed chamber into which the air cannot enter at j . The volume of the piston h reduces the volume of this chamber h^6 and therefore compresses the air in this chamber. This air therefore is forced from said chamber through the vertical lateral passage 1⁶ (Figure 4). The air flows from this passage through the passages 17, 18 to the upper portion of the well 1¹ made in the passage of the fuel with which it communicates by a recess. The movement of the piston therefore induces the inflow of the fuel contained in the well 1¹ and brings this fuel to the well 1. In the return stroke of the piston the air forced into the well 1¹ returns into the chamber h^6 .

The addition of air to the mixture will now be described. Air heated by the engine exhaust or otherwise, enters by the pipe o and is drawn through the nozzle m by the suction of the engine mixing with the mixture entering the nozzle m through the ports m^2 . This mixture then enters a hollow chamber n communicating by passages n^1 with the chamber n^2 of the induction pipe n^3 of the engine, mixing with air drawn into the mixing chamber n^4 by the engine and an air-fuel mixture having a composition of optimum quality enters the cylinders of the engine through the induction pipe n^3 . The inlet of the main air is regulated by the valve n^5 , which uncovers to a greater or less extent the opening n^6 . This plug valve is affixed to the member g by a connecting rod n^7 and a piston rod n^8 .

The action of the carburetor when working under normal pressure is as follows:

1. The main air enters through the ports n^5 controlled by the valve n^5 .

2. Heated air enters through o and passes through the nozzle m^3 .

5 3. Air for aerating the fuel enters through ports j .

4. Further air compressed by the piston h^1 for starting enters through ports j .

These admissions of air are controlled by the rotation of the spindle g^3 . When this latter has rotated in the direction of the arrows shown on Fig. 1, the piston a^4 has risen, increasing the flow of fuel; the piston h has risen at the same time increasing the flow of air and the piston n^8 descended, increasing the flow of main air. These different movements caused by the rotation of the spindle g^3 are controlled by the accelerator pedal connected to this latter. At the time of decelerating the inlet of fuel is diminished at the same time as that of the air. The piston h^1 by its rapid descent causes a slight fall of pressure on the carburant which balances the inertia of this latter and prevents the enrichment of the mixture at the moment when the engine is being slowed up. The use of the piston h^1 is thus to render the engine more sensitive to the accelerator pedal.

At the end of the stroke of the piston a^4 the valve a^3 completely shuts off the fuel inlet avoiding loss during stopping or during long descents if the engine is not running.

The stroke of the pistons and the air inlets are controlled to give the best mixture for each position of the accelerator.

Adjustments are made from time to time by moving the fulcrum of the lever c , a movement controlled through the cam d^3 and arm d by the spindle d^4 affixed to the control lever to slightly modify the proportion of fuel to air. This proportion varies with temperature, compression, height and the composition of the fuel.

Having thus described my invention, I claim:

1. A carburetor including a fuel inlet, a needle valve to control said inlet, a piston, a cylinder in which said piston operates, a sleeve carried by said piston and in which said needle valve is arranged, a spring in said sleeve bearing on said needle valve, a control shaft, a lever operated by the control shaft and having a floating fulcrum, a rod connecting said lever to said piston, and means to vary the position of the floating fulcrum to thereby vary the stroke of the piston.

2. A carburetor including a fuel inlet, a needle valve to control said inlet, a piston, a cylinder in which said piston operates, a sleeve carried by said piston and in which said needle valve is arranged, a spring bearing on said needle valve, a controlling element, a lever operated by the controlling element and having a floating fulcrum, a rod

connecting said lever to said piston, and means to vary the position of the floating fulcrum to thereby vary the stroke of the piston, said carburetor also having a well in the path of the fuel, ports communicating with said well and with the mixture outlet of the carburetor, air ports, a vertical hollow piston closed at its lower end and provided with ports which register with such air ports, said last named piston being active to force aerating air through the fuel in said well and means actuated by said controlling element to actuate said hollow piston.

In witness whereof I affix my signature.

ANTOINE GIRIN.