

Oct. 6, 1942.

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2,297,736

CARBURETOR

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2 Sheets-Sheet 1

Fig. 1.

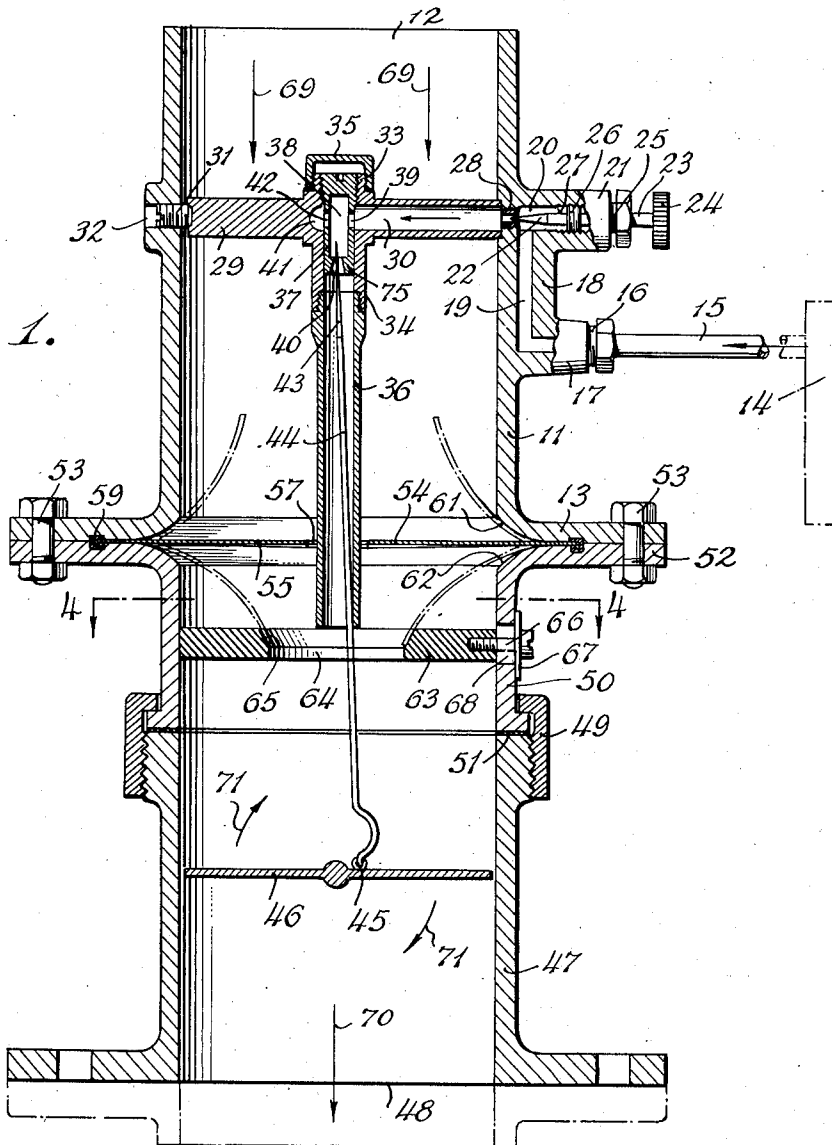
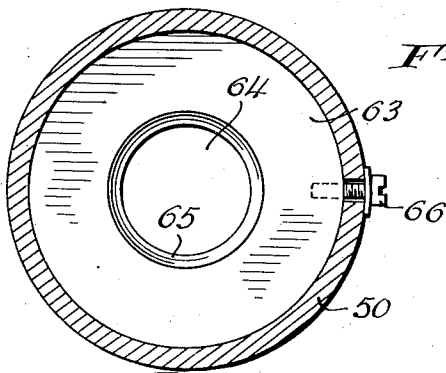


Fig. 4.



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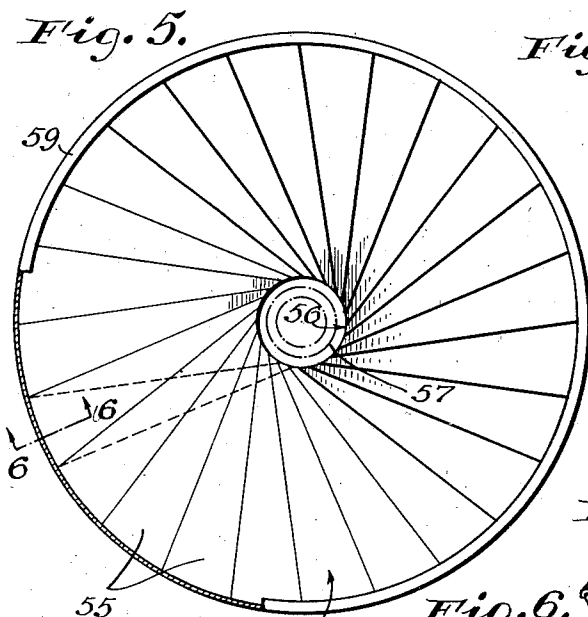
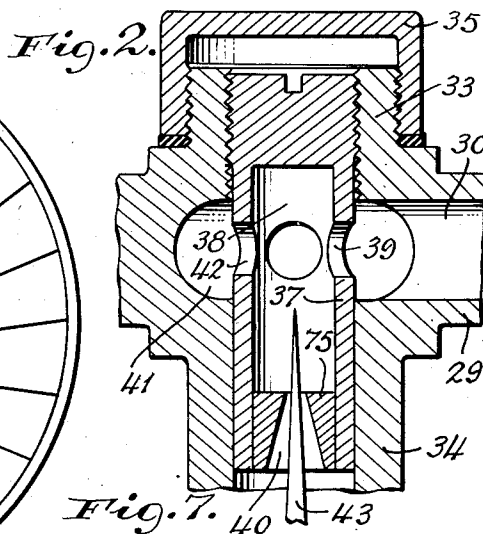
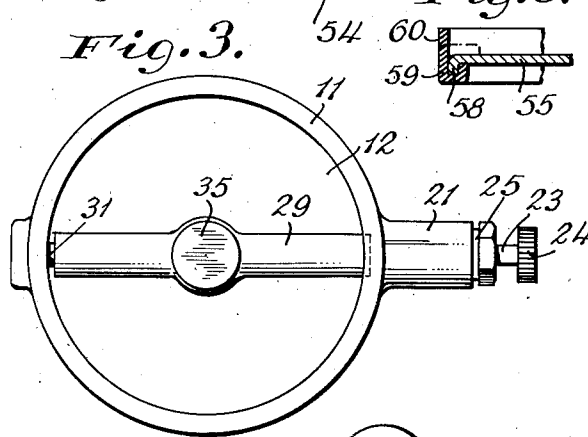
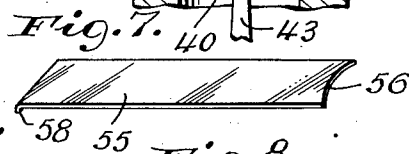
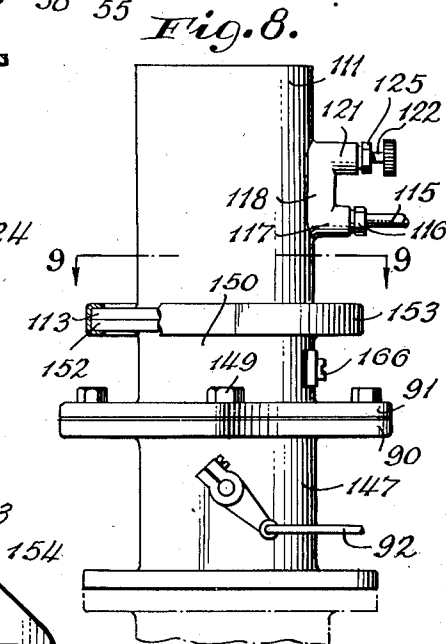
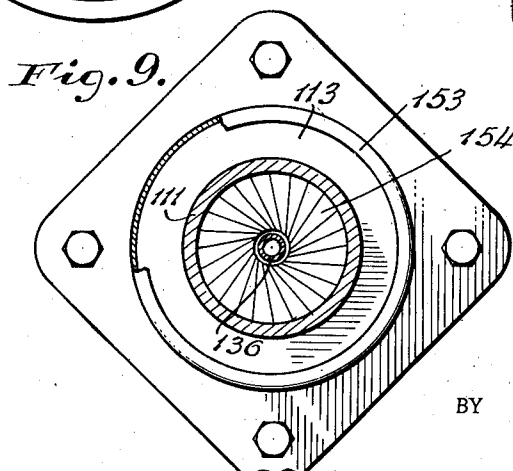
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CARBURETOR

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Application July 11, 1941, Serial No. 401,937

1 Claim. (Cl. 261—51)

This invention relates to fuel atomizers or carburetors for internal combustion engines.

An object of the present invention is the elimination of fuel pumps, accelerating jets, check valves, idle jets, idle screws, vacuum pistons, float chambers, float and fuel valves and similar devices used in existing carburetion systems by the provision of a carburetor wherein fuel is drawn directly from the source of supply by vacuum created in a discharge pipe or nozzle and is mixed with air to form a combustible mixture.

Another object is the provision of a carburetor which is of simple construction, efficient in operation and inexpensive to manufacture.

Other objects will become apparent in the course of the following specification.

In accomplishing the objects of the present invention, it was found desirable to connect the source of fuel directly with a metering needle valve operated by the throttle valve of the engine, the amount of air mixing with the fuel being automatically regulated by a resilient diaphragm which is operated by suction or pressure difference to vary the operative area of the air passage, so that a uniform ratio of fuel and air is maintained throughout the entire range of speeds of the engine.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing, by way of example only, preferred embodiments of the inventive idea.

In the drawings:

Figure 1 is a vertical section through a carburetor constructed in accordance with the principles of the present invention.

Figure 2 shows in section and on an enlarged scale the fuel control mechanism of the carburetor.

Figure 3 is a top view of the carburetor.

Figure 4 is a transverse section along the line 4—4 of Figure 1.

Figure 5 is a top view of a diaphragm.

Figure 6 is a section along the line 6—6 of Figure 5, on an enlarged scale.

Figure 7 is a perspective view of one of the blades of the diaphragm.

Figure 8 shows in side elevation a somewhat differently constructed carburetor.

Figure 9 is a section along the line 9—9 of Figure 8.

The carburetor shown in Figures 1 to 4 of the drawings includes a carburetor body or casing 11 having the form of a pipe provided with an up-

per air inlet opening 12 and a lower flange 13 (Figure 1).

The fuel is supplied from a tank 14 through a supply pipe 15 which is connected in a fluid-tight manner by a threaded stuffing box 16 with a boss or tube 17 which is integral with the body 11. A thicker wall 18 of the body 11 encloses a passage 19 which is in communication with the tube 17 and the pipe 15, and which leads to a chamber 20 formed in a boss 21 which is also integral with the body 11.

The boss 21 contains a needle valve regulating the amount of flow of the fuel and comprising a tapered valve body 22 constituting an end portion of a pin 23 which projects out of the boss 21 and carries a manually operated knob 24. A stuffing box 25 provides a fluid-tight closure, while a threaded sleeve 26 which is keyed upon the pin 23 meshes with screw threads 27 provided in the walls of the chamber 20. Thus by turning the member 24, the position of the valve body 22 may be conveniently varied in relation to the valve seat, constituted by a restrictor or sleeve 28 which is screwed into an opening formed in a wall of the body 11 and extending between the interior of the body 11 and the chamber 20.

A fuel control member 29 has one end engaging the sleeve 28 and fitting into a recess formed in an inner surface of the body 11. This part of the member 29 has the form of a tube enclosing a passage 30 which may communicate with the chamber 20 through the restrictor 28.

Another part of the member 29 has the form of a solid pin and is engaged by a distancing screw 31 situated within a threaded hole 32 of the body 11 and used to maintain the member 29 in position within the body 11. The central part of the member 29 consists of an upwardly extending tube or sleeve 33 and a downwardly extending tube or sleeve 34 constituting a housing for the metering needle valve. The sleeve 33 and the tube 34 have the same central axis extending at right angles to the longitudinal axis of the member 29. The sleeve 33 has inner and outer screw threads and is covered by a cap 35 screwed upon the outer screw threads of the sleeve 33. The lower end of the tube 34 is threaded and carries an elongated downwardly extending fuel discharge pipe or nozzle 36 which is suspended from the tube 34.

The inner screw threads of the sleeve 33 are used to hold a hollow member 37 carrying a seat 75 of the metering needle valve (Figs. 1 and 2). The member 37 has the form of a cylindrical body having an inner chamber 38 which communicates

by means of an opening 39 with the passage 30 and which also communicates with the interior of the pipe 36 by means of a conical passage 40 formed in the valve seat 75. A groove or passage 41 is formed in the member 29 and extends around the member 37. The groove 41 is in communication with the chamber 38 within the member 37 by means of an opening 42 formed in the member 37 and situated opposite the opening 39.

The valve body of the metering needle valve consists of a long tapered end 43 of a needle body 44 the lower end of which is pivotally connected at 45 to the carburetor throttle plate 46. The throttle plate 46 is swingably mounted in a tubular lower casing 47, the opening 48 of which leads to the intake manifold of the engine. The throttle valve is of standard construction and is not illustrated in detail in the drawings.

A union 49 is screwed upon the upper end of the casing 47 and is used to connect the casing 47 with an intermediate casing 50, a gasket 51 being interposed between the casings 47 and 50 to provide a fluid-tight connection. The casing 50 has a flange 52 which is connected with the flange 13 of the casing 11 by the bolts 53. The use of the union 49 makes it possible to adjust the position of the casings 11 and 50 in relation to the lower casing 47.

The diaphragm 54 (Fig. 5) consists of a plurality of resilient substantially radially disposed blades 55 made of spring steel or other suitable material and partly overlapping each other to form a Venturi-like structure. As shown in Figure 7, each of the blades 55 has an inner edge 56 which is so curved that the overlapping edges 56 of all the blades 55 form a round edge portion situated around the pipe 36 and enclosing an annular passage 57 for the inflowing air.

The outer edges of the blades 55 are provided with downwardly extending flanges 58 fitting into an annular groove provided in a blade-holding ring 59.

The diaphragm 54 may be manufactured by arranging the blades 55 in the proper manner with their flanges 58 in the groove of the ring 59 and by pressing then a flange 60 of the ring 59 from a position shown in full lines in Figure 6 to a position shown therein by broken lines. The flange 60 then covers the flanges 58 of the blades 55 which are firmly clamped by the ring 59.

As shown in Figure 1, the ring 59 holding the blades 55 is firmly clamped between the flanges 13 and 52 and is situated in recesses formed in these flanges. The inner surfaces of the casing 11 and 50 adjacent to the blades 55 include recessed curved portions 61 and 62, respectively, which permit the blades 55 to move outwardly or inwardly from their normal horizontal position to positions shown by broken lines, thereby increasing the area of the passage 57 available for the flow of the air.

A plate 63 has a central opening 64 enclosed by slanting surfaces 65 which serve as a stop to prevent an excessive outward or downward bending of the blades 55. The plate 63 is situated within the casing 50 and is held in place by a bolt 66. The bolt 66 is provided with a washer 67 and extends through an elongated opening 68 formed in the casing 50, so that the position of the plate 63 may be conveniently adjusted.

In operation, as the engine is started by hand or by a starter, air is drawn through the opening 12 in the direction of the arrows 69 inside the casing 11. The air will flow around the fuel control member 29 and through the narrow passage

57 between the pipe 36 and the diaphragm 54 which is then situated in the position shown by full lines in Figure 1. The flow of air around the pipe 36 and through the opening 64 of the plate 63 will create suction at the lower end of the pipe 36, which is further intensified by the action of the engine. This suction causes a flow of fuel from the supply tank 14 and through the pipe 15 and the passage 19 to the chamber 20.

The needle valve 22 is used to limit the maximum amount of fuel passing through the restrictor 28 and may be conveniently adjusted by turning the knob 24 to adapt the carburetor to various individual requirements.

The fuel flows from the chamber 20 and through the restrictor 28, the passage 30 and the opening 39 into the chamber 38. Thence it flows around the metering needle valve 43, 44 and through the passage 40 and the nozzle or pipe 36. As the fuel leaves the lower end of the pipe 36, it is mixed with air which is flowing past it, so that a combustible fuel air mixture is formed which is carried to the engine in the direction of the arrow 70.

As the throttle is opened wider and the throttle plate 46 is turned in the direction of the arrows 71, the needle 43, 44 of the metering valve is moved downward due to its connection at 45 with the throttle plate 46, thereby increasing the operative cross-sectional area of the passage 40, so that more fuel is drawn in proportion to the air entering the carburetor. The increase of the area available for the passage of air, which is caused by the turning of the throttle plate 46, will increase the pressure of the flowing air upon the diaphragm 54, so that the blades 55 of the diaphragm will be pressed downwardly and outwardly, thus increasing the area of the passage 57 between the edges 56 of the blades 55 and the nozzle or pipe 36. Thus more air will flow through the passage 57 and be mixed with the fuel leaving the pipe 36.

It is thus apparent that an increase in the amount of supplied fuel will be followed automatically by an increase in the amount of air, so that a uniform ratio of fuel and air is maintained in the combustible mixture throughout the entire range of speeds. The proportion of supplied gas is affected by the tapered metering valve needle 43 which moves up and down in the passage 40.

In case of a backfire of the engine, the blades 55 of the diaphragm 54 bend inwardly or upwards, so that the diaphragm will not be damaged by the backfire.

The described carburetor is of simple and sturdy construction and it effectively eliminates the necessity of using fuel pumps, float chambers and valves, and many other parts, since fuel is drawn directly from the tank 14 due to the suction or vacuum created in the discharge pipe or nozzle 36.

The carburetor shown in Figures 8 and 9 includes an upper casing or carburetor body 111 having a lower flange 113 which is permanently connected with a flange 152 of an intermediate casing 150 by a clamping ring 153. The carburetor is supplied with fuel through a pipe 115 connected by a stuffing box 116 with a boss 117 which is integral with the casing 111. A thicker wall 118 of the casing 111 contains a passage (not shown) which connects the pipe 115 with the interior of a boss 121 integral with the casing 111. The boss 121 contains a needle valve 122 extending through a stuffing box 125.

The fuel control member, the metering needle valve and the fuel discharge pipe 136 are of the same construction as those previously described. The lower casing 147 of the carburetor comprises a flange 90 which is connected with the flange 91 of the intermediate casing 150 by bolts 149. Thus the casings 111 and 150 may be conveniently adjusted in relation to the lower casing 147.

The diaphragm 154 is held between the flanges 113 and 152 and the downward movement of its blades is stopped by an annular plate (not shown) which is held within the intermediate casing 150 by a screw 166. The throttle valve plate (not shown) which is situated within the lower casing 147 is operated by a leverage system 92.

The operation of this carburetor is the same as of that illustrated in Figures 1 to 4.

It is apparent that the specific illustrations described above have been given by way of illustration and not by way of limitation, and that the shown structures are subject to wide variation and modification without departing from the scope or intent of the present invention. All of such variations and modifications are to be included within the scope of the present invention.

What is claimed is:

In combination with a fuel tank and a throttle

valve plate; a carburetor, comprising a casing having openings formed therein for the flow of air therethrough, a fuel control member situated within said casing and having a passage formed therein for the fuel, means connected with said fuel control member and said casing for transmitting fuel directly from said fuel tank to the passage of said fuel control member, a fuel discharge pipe carried by said fuel control member and having an end situated within said flow of air, a diaphragm having the form of an annular plate consisting of resilient blades situated within said casing and extending transversely thereto, said resilient blades being bendable in two opposite directions in relation to said fuel discharge pipe to vary the area of a passage for said flow of air between said blades and said fuel discharge pipe, a valve in said fuel control member, means connecting said valve with said throttle valve plate, whereby said valve is actuated by said throttle valve plate, and a stop member situated within said casing between said diaphragm and said throttle valve plate and having surfaces adapted to be engaged by the bent resilient blades to prevent further bending of said blades.

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