

July 1, 1958

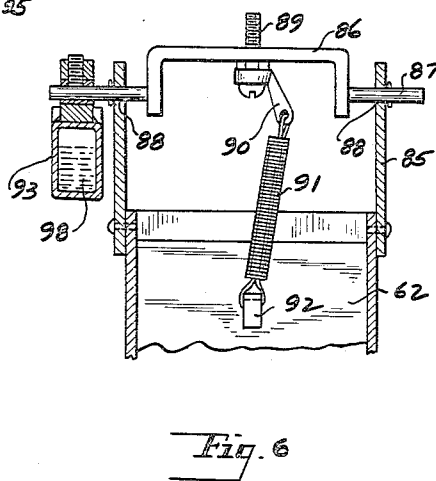
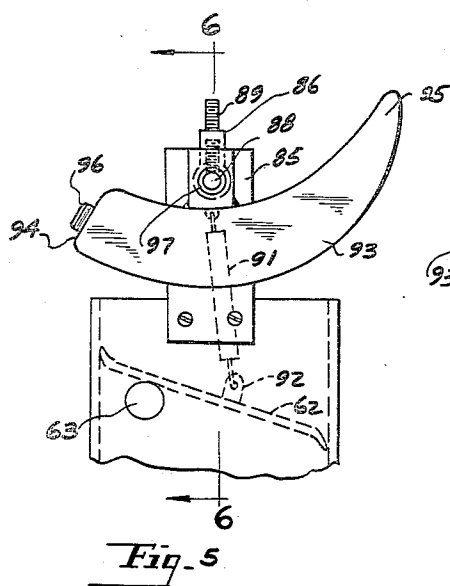
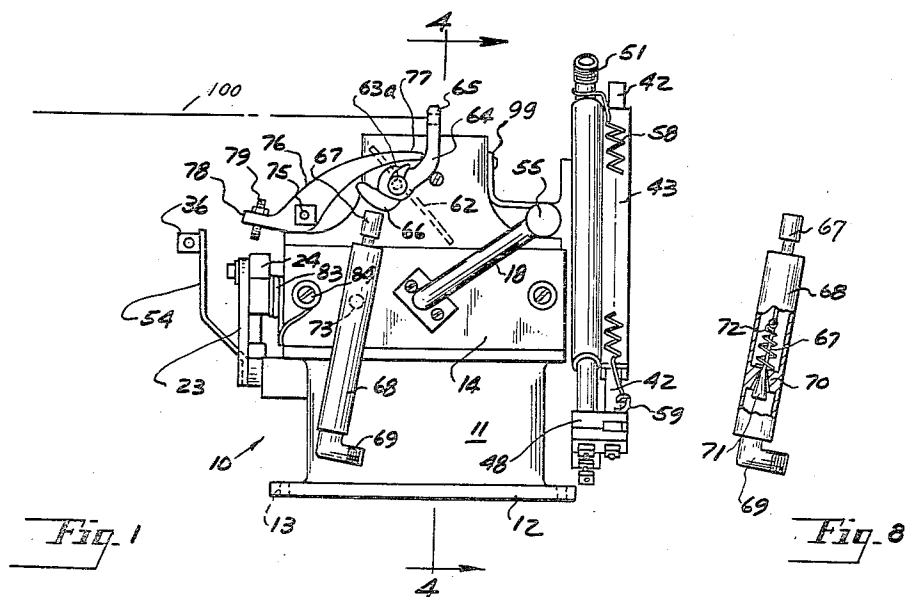
W. BROGE

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CARBURETOR FOR INTERNAL COMBUSTION ENGINES

Filed March 30, 1956

2 Sheets-Sheet 1



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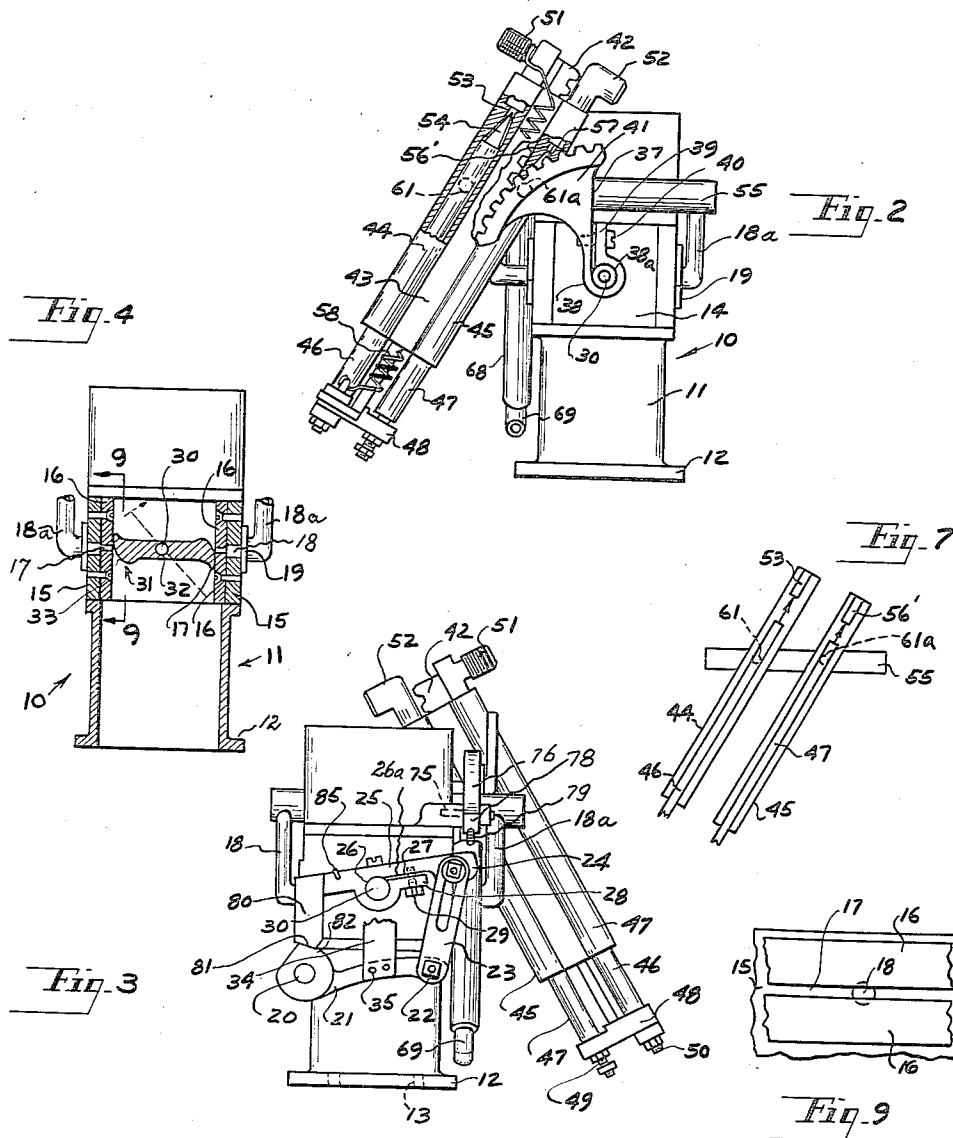
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CARBURETOR FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 2



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CARBURETOR FOR INTERNAL COMBUSTION ENGINES

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Application March 30, 1956, Serial No. 575,020

3 Claims. (Cl. 261—44)

The improvement pertains to a carburetor which has no floating chamber and needs no pump for delivery of fuel to the cylinders of the engine, but which is fully practical and economical in use.

The general object of the improvement is to render the carburetor more efficient, but more specifically to make it capable of producing such mixture of fuel and air as will be conducive to the development of more power without the proportional increase of the fuel. A further object of the improvement is to provide a carburetor which will be quickly responsive to the varying load upon the engine to which fuel will be delivered from said carburetor. To attain this object the carburetor contains a combination of elements which cooperate to maintain a vacuum pull at high lever all through the range of speed of the engine. Another object of the improvement is to provide a carburetor which will have means to adjust itself to angle of climb of the vehicle driven by the engine.

These and other advantages of which the carburetor is capable, will become apparent from the description of said carburetor with reference to the accompanying drawings in which;

Fig. 1 is a side elevational view of the carburetor;

Fig. 2 is a one end view thereof;

Fig. 3 is the view of the carburetor from the opposite end;

Fig. 4 is a vertical sectional view on line 4—4 of Fig. 1;

Fig. 5 is a side view of the upper portion of the carburetor;

Fig. 6 is a sectional view on line 6—6 of Fig. 5;

Fig. 7 is a diagrammatic view of elements designed to convey fuel to a mixing chamber of the carburetor, the view including control means for said elements;

Fig. 8 is a side view, partly in section, of a member of the carburetor;

Fig. 9 is an enlarged view of a detail of structure as seen from line 9—9 in Fig. 4.

Similar numerals refer to similar parts throughout the several views.

The carburetor includes a substantially rectangular casing, generally indicated by numeral 10. The casing comprises a lower portion marked 11, said portion being rectangular in form and being provided at the base with a peripheral flange 12. The flange contains a plurality of holes 13 for reception of screws by which the housing may be mounted over an opening in the intake manifold of an internal combustion engine, such as the engine of an automobile. Said lower portion 11, serving as the mixing chamber for fuel and air, is open at the bottom, as shown in Fig. 4. Disposed over the lower portion is a mid-portion 14 including two side walls 15, said mid-portion projecting at each end beyond the respective end of the lower portion, but opening fully into the mixing chamber below. Mounted upon each side wall 15, on the inner surface thereof, are two horizontally-disposed bars 16, the bars extending parallel to each other from one end of the mid-portion to the other,

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but leaving a narrow space 17 therebetween. Each wall 15 contains a circular aperture 18 opening into said space 17, the aperture serving as a duct for admission of liquid fuel from a tube 18a which, by means of a flange 19, is secured to the outer surface of said wall 15, as shown in Fig. 4. It will be noted that this arrangement is disclosed on each side of the casing.

Located externally of the casing, and pivoted upon a short, horizontal shaft 20 projecting from the casing, is an arm 21 which at its outer end is pivotally connected, by means of a pin 22, to a substantially vertically-disposed link 23. At its upper end the link is connected to one end 24 of a rocker bar 25. Intermediate its ends, the bar contains a circular aperture 26 and is slotted longitudinally beginning at said aperture, as shown at 26, so as to form an integrally connected jaw 28. A screw 29 threaded into the bar 25 through said jaw serves to adjust the frictional engagement of the bar with a shaft 30. The latter is journaled in the two end walls of the midportion 14 of the casing. Mounted upon the shaft 30, within the casing, is a throttle valve 31. The valve has the form of a thick rectangular plate provided, intermediate its ends, with a transverse bore 32, each end of the valve 31, being defined by an arcuate surface 33. One end of the valve bears normally against a bar 16 above the spacing 17, the other end of the valve bears against a bar 16 on the opposite wall 15 below the spacing 17.

It will be understood that the valve 31 is keyed to the shaft 30 so that it may be turned by said shaft about the axis thereof. This is effected by means of a lever 34 which is connected to the arm 21 by means of bolts 35 and which at its outer end is provided with an eyelet 36 for connection to the accelerator pedal of an automobile.

Axially keyed to that end of the shaft 30 which is remote from said rocker bar 25, and which projects outwardly out of the casing, is a sector gear 37. The hub portion 38 of said gear contains a circular aperture 38a for axial engagement with the shaft 30, said hub being also split radially to form an integrally formed jaw 39. A screw 40 threaded into webbing 41 of the sector gear through said jaw 39 serves as a means of holding the sector securely on said shaft 30, but permits adjustment of the position of the sector gear on said shaft when necessary.

The sector gear is in mesh with a rack 42 which is slidably disposed in a U-shaped channel track 43. The channel track is connected to a pair of tubular members marked 44 and 45, respectively, said tubular member being in a parallel relation to each other and to said track, and being substantially of the same length as said track. Located in each of the members 44 and 45, is a sliding pin, one of said pins being marked 46, the other being marked 47, the two pins and the rack being connected to the same end plate 48. The plate is provided with apertures for application of screws 49 by means of which the rods are secured to said plate, while a screw 50 is used to fasten to the plate by intermediate means, the lower end of the rack.

At the top, the tubular member 44 is provided with a nipple 51 for connection to a fuel conveying pipe which is not shown. Similarly the upper end of the tubular member 45 is provided with an internally threaded nipple 52 for connection to a separate fuel conveying pipe which is not disclosed in the drawings. It will be understood that both pipes lead to the common source of fuel, such as a tank.

The tubular member 44 contains in its upper portion an orifice 53 of restricted diameter, the orifice being controlled by a valve needle 54. At a level below said orifice, the tubular member is connected to a horizontally

disposed cylinder 55 which is secured to the upper portion of the casing 10 by a bracket 99. Leading from each end of the cylinder is the already described fuel conveying tube 18. The other tubular member 45 also opens into the cylinder 55 and contains a similar orifice 56, controlled by a needle valve 57 but the orifice is at a different level than the first named orifice. This is shown in the diagrammatic presentation in Fig. 7, in which the needle valves in tubular members 44 and 45 are represented by arrows, and in which the apertures leading from said tubular members into the cylinder 55 are indicated by numerals 61 and 61a respectively. It will be noted that the needle valves in the respective tubular members 44 and 45 are at different levels. Since the two rods 46 and 47 which carry the needle valves, move in unison, and since the rods normally block said apertures but open them only when moved downwardly, rod 47 will first uncover aperture 61a whereupon on continuation of the downward movement of the two rods, rod 46 will uncover aperture 61.

Located within the top portion of the casing is a choke valve 62, the valve having the form of a rectangular plate mounted upon a horizontal shaft 63. The shaft is journaled in two sidewalls of the casing, and includes one end which projects outwardly of the casing and terminates with a radial shaft 63a. Pivotaly mounted on said end of the shaft 63a, is a two-arm lever 64, one arm 65 of which is connected to suitable means such as a rod for manual control of the valve. The other arm carries a cam 66 which is adapted to bear against the upper end of a rod 67. The latter is located in a substantially vertical tube 68, which is secured to one side of the casing and which is equipped at the lower end with a nipple 69 for connection to a fuel supply pipe which is not shown.

Located within the tube 68 is a valve consisting of an annular member 70 having a central aperture which is normally closed by a cone shaped or needle shaped plug 71, which is mounted on the lower end of the rod 67 and fits from below into said aperture. A coiled spring 72, associated with said rod, urges it upwardly to keep the aperture closed.

An opening 73 in the wall of the tube 68 leads into the mixing chamber of the casing through the spacing 17 between bars 16 on the inside surface of the casing.

Pivotaly mounted upon a pin 75 which projects horizontally from the casing above the midportion thereof, as shown in Fig. 1, is a two-arm lever 76 one end of which, marked 77, bears against the upper end of the lever 64 and is adapted to be actuated thereby. The opposite arm 78 of said lever 67 carries an adjusting screw 79, the lower end of which is adapted to be brought down by said arm 78 to bear from above against that end 24 of the rocker bar 25 which is connected to the link 23. The opposite end of the rocker bar carries a downwardly extending lifter 80, defined at the bottom by a downwardly slanting face 81. The face is in contact with a cam 82 which form that portion of lever 21 which pivotaly embraces shaft 20, already described herein. A spring 83 coiled about the shaft 30 is anchored at one end to the casing by means of a screw 84. The other end 85 of the spring is hooked over the rocker 25 close to the lifter 80, urging said lifter into contact with the cam 82.

The drawings in Fig. 5 and Fig. 6 show a mechanism which may be used in conjunction with the carburetor and which is employed to actuate the choke valve 42. The mechanism includes a pair of upright bars 85 which are secured to the opposite sides of the top portion of the casing 10 by screws 86. Supported by said bars 85 is a crank 86 which at end includes a stub axle 87 journaled in an aperture in one of said bars. Thus mounted the crankshaft is located above the casing along a median line thereof. The crank is provided with a threaded hole for reception of an adjusting screw 89. Connected to the screw by means of an eyelet 90 is one end of a coil spring 91, the other end of which is con-

nected to an eyelet 92 on the upper surface of the choke valve 62. Keyed to the end of one stub axle 87 is a crescent shaped container 93. It will be noted that one end of the container is stubby as shown at 94 while the container tapers from its mid portion to a pointed opposite end. The stubby end is provided with an aperture which is normally closed by a threaded plug 96. The container is mounted upon the respective axle 86 by means of a small block 96 which is welded to the container at the dip between two upwardly turned ends as shown in Fig. 5. Inside, the container holds a quantity of mercury 98 which normally fills the mid portion of the container while the end portions thereof are empty.

The manner in which the carburetor operates is as follows:

It will be assumed that the throttle valve 31 in the mid-portion of the casing 10 is in a closed position, as shown in Fig. 4, and that the choke valve is open, as shown in Fig. 1. To start the engine, the initial flow of fuel into the carburetor is delivered through a tube 68 shown best in Figs. 1 and 8. As the valve in said tube is normally closed, it has to be opened. This is effected by means of the lever 64 which is operated remotely by a rod or a cable indicated by numeral 100 and attached to end 65 of said lever 64. The lever controls the position of the choke valve 62 and carries the cam 66, which depresses the top of said rod 67 to open the valve within said tubular member 68. Simultaneously, the lever 64, when pulled back by the rod 100, will tilt lever 76, causing the lower tip of screw 79 to bear against end 24 of the rocker 25 which controls the throttle valve 31. As the end 24 of the rocker is depressed, the throttle valve is slightly opened to admit a limited quantity of air into the mixing chamber in the lower portion 11 of the casing 10. The air sucked into the mixing chamber by the action of the cylinders in the cylinders of the engine rushes along the bars 16 and across the narrow spacing 17 therebetween, through which spacing fuel is admitted to the carburetor. Drawn in by the air, the fuel reaches immediately the relatively largely-expanded mixing chamber of the casing where the air and the fuel expand in volume, are commingled in the process, and are drawn into the intake manifold of the engine.

For normal driving, the fuel is delivered to the carburetor through the tubular members 44 and 45. The needle valves which control admission of fuel to the carburetor through said tubular members are indirectly actuated by the accelerator pedal of the automobile. The pedal, as already described, is adapted to actuate, through intermediate means, the arm 21 and through said arm and through the link 23 connected to the arm, the rocker 25. When the accelerator pedal is depressed, the rocker imparts a rotary movement to shaft 30 which at one end is keyed to sector gear 41. The sector gear, being in mesh with rack 42, drives the rack downwardly against the tension of spring 58. Pins 46 and 47, disposed in the tubular members 44 and 45, respectively, move down with the rack to which they are connected by plate 48.

In the course of its movement downwardly, pin 47, as best shown in Fig. 7, will first open the aperture 61a for admission of fuel through said aperture into the spacing 17 between bars 16. Because the shaft 30 which supports the sector gear 41 is the member which supports the throttle valve 31, the rotary movement of the shaft will result in a gradual opening of said valve 31, permitting a larger volume of air to enter into the mixing chamber of the carburetor and to suck in a proportionately larger volume of fuel.

If still higher speed is required and the accelerator pedal is depressed further, the rack 42 will pull the pins 46 and 47 downwardly till the other pin 46 will open the other aperture 61 for admission of more fuel into the carburetor. On release of pressure on the accelerator pedal, the spring 58 will pull up the rack to its initial

position, causing the pins to close said apertures 61 and 61a in the order stated.

The mechanism shown in Figs. 5 and 6 is designed to automatically actuate the choke valve when the mixture of fuel and air is to be enriched, as when an automobile tilts upwardly while climbing a hill. As described herein, the mechanism includes a container filled partly with liquid mercury, the container being suspended from a shaft 87 which actuates a crank 86. As the automobile begins to climb, the container, weighed by mercury, imparts a limited rotary movement to the crank 86 and elevates the lower portion of the screw 89 which is threaded into the crank. The screw pulls up the choke valve 62 towards its closed position. It will be understood that the downward pull of air drawn into the cylinder of the engine through the carburetor will not permit full closing of the choke valve, but the volume of air drawn into the carburetor will be sufficiently restricted to enrich the mixture of said air and fuel, which mixture is to be delivered to the engine.

It will be obvious that some changes and refinements may be made in the structure of the carburetor and the operative elements disclosed by me, but that such changes may still be within the frame of my inventive concept.

What I, therefore, wish to claim is as follows:

1. In a carburetor for an internal combustion engine, a rectangular vertical casing including a lower portion open at the bottom into the intake manifold of the engine, a top portion, and a midportion defined by two parallel side walls and two transverse walls, two parallel bars mounted horizontally on each side wall of the midportion inside the casing, the bars being spaced from each other to leave a narrow free space therebetween, a thick two-wing butterfly valve mounted within the midportion of the casing upon a horizontal shaft journaled in said transverse walls, the outer end of each wing being disposed parallel to the bars on the respective side wall of the casing and being normally in position to block the free space therebetween, a horizontal cylinder outside the casing, a pipe leading from the cylinder into the free space between the bars on one side wall, a similar pipe leading from the cylinder to the free space between the bars on the other side wall, two tubular members for delivery of fuel to the cylinder, each tubular member having an outlet port leading to said cylinder, a sliding pin disposed in each tubular member and normally blocking the outlet port therein, gear means mounted on one end of the shaft, a rack in mesh with said gear means and connected to the pins for movement therewith as a unit, lever means to operate the valve to unblock the free spaces between the bars and to impart, by means of the rack, longitudinal movement to the pins to unblock the outlet ports in the tubular members in sequence, one by one.

2. A carburetor for an internal combustion engine, the carburetor comprising a vertically-disposed casing having an upper air intake portion of restricted horizontal area, a rectangular midportion of expanded capacity, and a bottom portion serving as a fuel-mixing chamber, the chamber opening into the intake manifold of the engine, the mid-portion being defined by two side walls and two transverse walls, a pair of parallel bars horizontally mounted on each side wall, inside the

casing, the bars being closely spaced from each other, each side wall being provided with an aperture leading from outside into the free space between the respective bars, a fuel delivery cylinder disposed outside the casing but connected to each aperture for delivery of fuel into the spaces between each pair of bars, a thick two-wing butterfly valve mounted within the midportion of the casing upon a horizontal shaft journaled in the transverse walls, the outer end portion of each wing being defined by a convex portion normally bearing against the respective pair of bars across the free space therebetween, a pair of fuel feed tubes disposed outwardly of the casing, each tube having an outlet port into said cylinder, a sliding pin disposed in each tubular member and normally blocking the outlet port therein, gear means mounted upon one end of the shaft, a rack in mesh with said gear means and connected to the pin for movement therewith as a unit, lever means to operate the valve to unblock the free space between each pair of bars and to impart, by means of the rack, longitudinal movement to the pins to unblock the outlet ports consecutively.

3. A carburetor for an internal combustion engine, the carburetor comprising a vertically-disposed casing having an upper air intake portion of restricted horizontal area, a rectangular midportion of expanded capacity, and a bottom portion serving as a fuel-mixing chamber, the chamber opening into the intake manifold of the engine, the midportion being defined by two side walls and two transverse walls, a pair of parallel bars horizontally mounted on each side wall, inside the casing, the bars being closely spaced from each other, each side wall being provided with an aperture leading from outside into the free space between the respective bars, a fuel-delivery cylinder disposed outside the casing but connected to each aperture for delivery of fuel into the spaces between each pair of bars, a thick two-wing butterfly valve mounted within the midportion of the casing upon a horizontal shaft journaled in the transverse walls, the outer end portion of each wing being defined by a convex portion normally bearing against the respective pair of bars across the free space therebetween, fuel-delivery tubes leading from outside into the free space between each pair of bars, and lever means to operate the valve to unblock the free spaces between each pair of bars and to admit air from the upper portion of the casing in downward drafts past said free spaces towards the intake manifold of the engine.

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