

June 7, 1932.

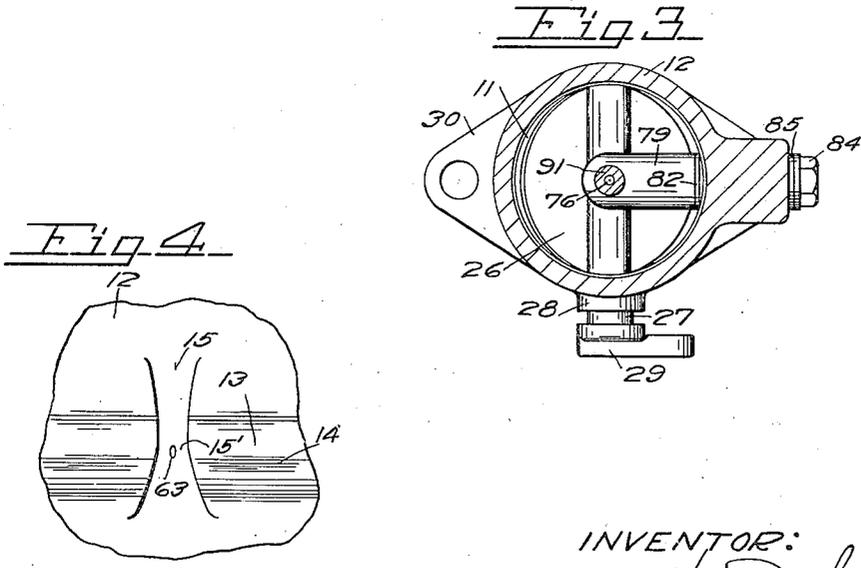
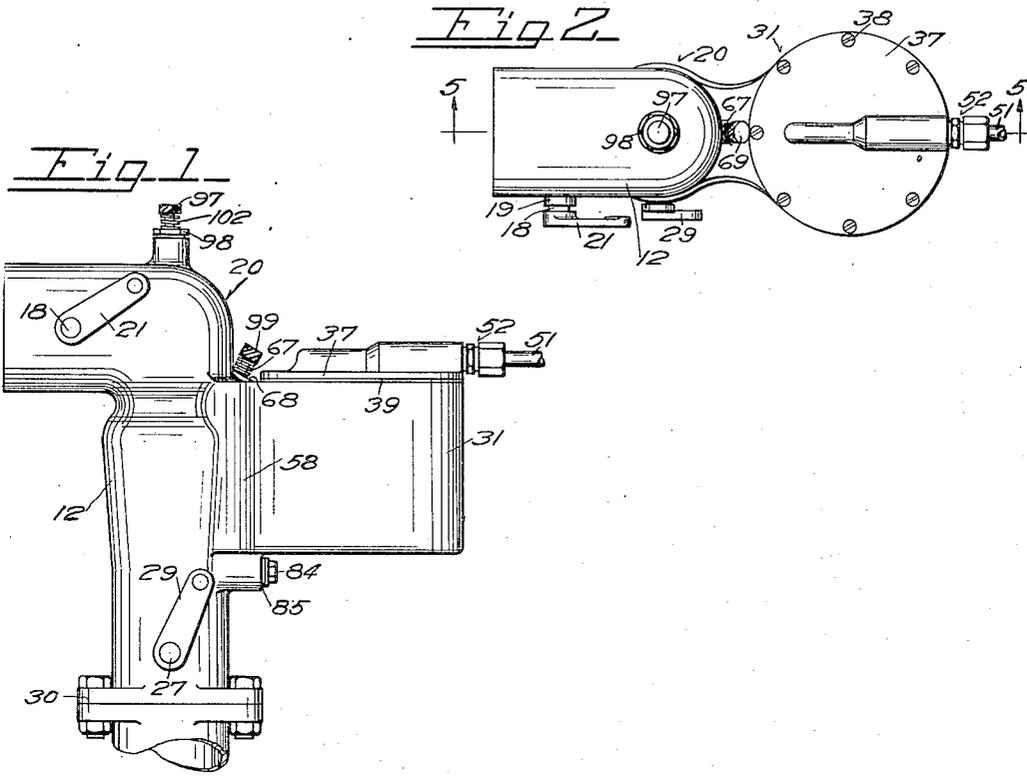
D. F. GINDELE

1,861,694

CARBURETOR

Filed May 1, 1931

2 Sheets-Sheet 1



INVENTOR:
Donald F. Gindele,
by A. H. Gabel, Attorney.

June 7, 1932.

D. F. GINDELE

1,861,694

CARBURETOR

Filed May 1, 1931

2 Sheets-Sheet 2

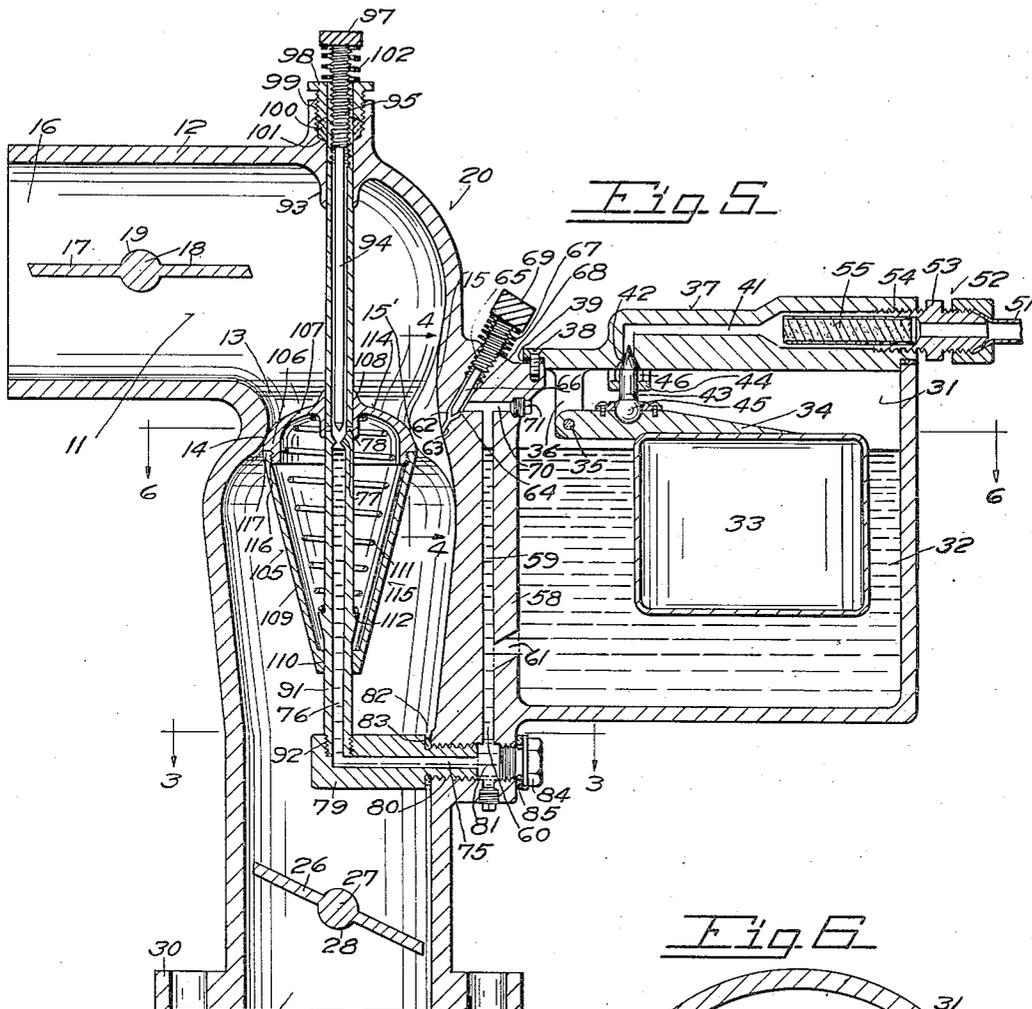


Fig. 5

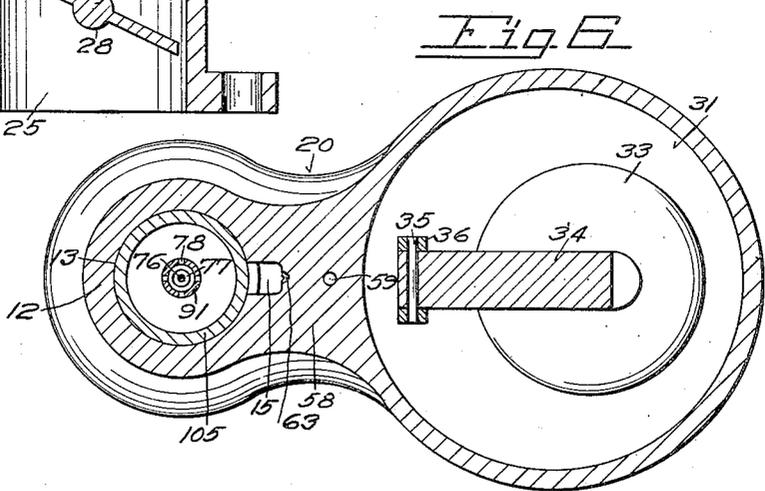


Fig. 6

INVENTOR:
Donald F. Gindele,
by A. P. Skelton,
His Attorney

UNITED STATES PATENT OFFICE

DONALD F. GINDELE, OF CINCINNATI, OHIO

CARBURETOR

Application filed May 1, 1931. Serial No. 534,318.

It is the object of my invention to provide a new and improved carburetor so arranged as to supply a smooth and even flow of fuel with proper admixture of air over the whole range of engine speeds; further, to provide a new and improved relation of fuel openings, air passages and air valve, for supplying an economical mixture of fuel and air for idling speed of the engine, and through a range between low engine speeds and moderate engine speeds, and for increased flow of fuel and air for full power of the engine, and at high engine speeds.

It is the object of my invention further to provide an air passage with an air valve seat, and a by-pass passage for air proximate thereto having a fuel feed port therein, said by-pass passage and fuel feed port being arranged to supply proper proportions of air and fuel for idling speeds of the engine, and for low engine speeds, governed by the extent of opening of the throttle valve; further, to provide means whereby the air valve is automatically moved off its seat to an extent dependent on a further extent of throttle opening for supplying additional air into the combustion mixture passage and additional air at the by-pass passage for increasing the flow of fuel through the fuel port in the by-pass passage for proper proportions of fuel and air in the explosive mixtures at a higher range of low engine speeds; and, further, to provide means whereby upon further automatic opening of said air valve induced by further opening of the throttle valve, an additional fuel port or ports is exposed, for supplying additional fuel with the additional air thus passing the air valve, induced by speedier rotation of the engine and suction in the fuel passage, for providing proper explosive mixture for high engine speed and for engine speed under great load.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 is a side elevation of my improved device.

Fig. 2 is a plan view of the same.

Fig. 3 is a cross-section of the same, taken in the plane of the line 3—3 of Fig. 5.

Fig. 4 is a side elevation of the interior of the casing viewed in the direction of the line 4—4 of Fig. 5, and partly broken away.

Fig. 5 is a vertical central section of my improved device, taken on the line 5—5 of Fig. 2; and,

Fig. 6 is a cross-section of the same, taken in the plane of the line 6—6 of Fig. 5.

A passage 11 has a wall 12 in which there is a constricted portion 13, on the lower constricted face of which there is a valve seat 14. The constricted portion is provided with a by-pass passage 15 extending lengthwise of the passage 11. The by-pass passage preferably has side walls which bulge toward each other and an outer wall which bulges correspondingly, these walls, together with the movable wall formed by the automatic air valve hereinafter described, forming a constricted throat 15' for said by-pass passage.

The intake portion 16 of the passage 11 has a valve 17 therein on a rock shaft 18 journaled in bearings 19 in the wall, which forms part of the casing 20 of the device. The rock shaft has an arm 21 thereon, with which suitable connections are made for operating the arm. This valve is known as a choke valve and is in open position during ordinary operation of the engine. It is arranged to be closed to greater or less extent when a less proportion of air is desired for starting the engine.

The outlet portion 25 of the passage 11 has a valve 26 therein, fixed to a rock shaft 27 journaled in bearings 28 in the wall of the passage and having an arm 29 fixed thereto. Suitable usual connections are made with this arm for operating the valve 26. This valve forms a usual throttle valve for the device.

The wall of the device is provided with a suitable flange 30 by means of which the device is secured in usual manner to the intake manifold of an explosive engine. The carburetor is shown as a down draft carburetor.

A float chamber 31 has a supply 32 of the liquid fuel therein, for instance gasoline, the level of the liquid being controlled by a float

33 on a lever 34 pivoted on a pin 35 in depending lugs 36 of a cover 37 for the float chamber. This cover is suitably fixed to the body of the float chamber by screws 38, a
 5 gasket 39 being located between the outer flange of the cover and the wall of the float chamber.

The cover has a fuel passage 41 therein, in which there is a valve seat 42. A valve
 10 43 is guided in a bearing 44, depending from the cover and has a universal joint connection 45 with the float lever 34. The bearing 44 is provided with a fuel passage 46, through
 15 which the fuel admitted past the valve seat readily flows into the float chamber.

A fuel pipe 51 leading from a suitable source of fuel supply is suitably connected with the cover by a usual connection 52, the connection being made with a nipple 53
 20 threaded into a threaded hole 54 of the fuel passage 41, and having a strainer 55 at its inner end for straining the fuel passing from the pipe 51 into the fuel passage 41.

The portion 58 of the wall 12 is enlarged
 25 and has passages 59, 60, therein which connect with the float chamber by means of a hole 61. At the upper end of the passage 59 there is a valve seat 62 having a fuel feed port 63. The valve seat is shown located in
 30 a passage 64 having a threaded portion 65 in which a needle valve 66 is threaded, the shank of the needle valve is preferably of less diameter than the portion of the passage
 35 64 adjacent to the valve seat for permitting ready flow of fuel to the valve seat. A spring 67 located between a shoulder 68 on the casing and the head 69 of the valve stem is arranged to hold the valve in adjusted positions.

For convenience in construction the upper
 40 end of the passage 59 is shown provided with a branch 70 in the wall of the casing, one end of which communicates with the passage 64, the other end of the branch passage being closed by a plug 71 threaded into the casing.

The lower end of the passage 60 is provided with a laterally extending branch 75 and is
 50 continued as an upwardly extending branch 76, in which there is a valve seat 77 and fuel feed ports 78. These fuel feed ports are shown as substantially on a level with the fuel feed port 63 and the automatic air valve seat 14.

Structurally these parts are shown comprising a branch pipe 79 having threaded connection 80 with the wall of a branch passage 81 in the casing. The branch passage 81 connects the passages 60 and 75. A washer 82
 60 is compressed between the annular shoulder 83 on the branch pipe 79 and said wall. A plug 84 has threaded connection with the wall of the branch passage 81, a washer 85 being compressed between the head of the
 65 plug and said wall.

The upwardly extending branch 76 of the fuel feed passage is shown in a fuel feed tube 91, the lower end of which is threaded, as at 92, in the inwardly extending branch pipe 79 and connecting the upwardly extending
 70 passage 76 with the laterally extending passage 75 in said branch pipe 79.

The upper end of the tube 91 is received in a bearing 93 in the upper end of the casing. The upper end of the tube is internally
 75 threaded. A valve 94 has threaded connection 95 with the upper end of said tube, this valve being shown as a needle valve having a valve portion coacting with the valve seat 96. Its upper end is provided with an adjusting
 80 head 97. A gland 98 has threaded connection 99 with the casing about said tube for compressing a packing 100 between the inner end of the gland and the inner end of a packing socket 101. A spring 102 is located between the gland and the head of the valve stem for maintaining the valve in adjusted positions.

An automatic air valve 105 has slide connection with the tube 91. Its exterior is of general acorn form. It has an outwardly
 90 bulged portion 106 at its upper end. The upper face of which is curved or slanted in dome-like form, as shown at 107, toward the portion of greatest diameter of said valve and has the valve face thereon which coacts
 95 with the valve seat 14.

The upper end of this valve is provided with a slide bearing 108 which slides on the tube and normally closes the fuel feed ports 78. The portion of said valve below its bulging
 100 portion of greatest diameter preferably slopes gradually toward the axis of said valve, being of general elongated frusto-conical or tapered form, as shown at 109. The lower end of said valve has a slide bearing 110
 105 about the tube 91.

The valve is guided in axial direction by means of its slide bearings at its respective ends about the tube, these parts being preferably annular. A spring 111 normally
 110 urges the valve into seated position. The spring is shown as a volute spiral spring located inside the valve 105 between a shoulder 112 on the tube and the upper wall of the valve.
 115

For convenience in assembling the parts, the valve is preferably made in a plurality of parts, shown as a head portion 114 and a tail portion 115 having threaded connection 116
 120 between them and forming a shoulder joint 117 preferably for continuity of contour of the outer face of the valve.

For assembling the parts in the passage 11, the spring and the automatic air valve are preferably assembled about the tube, the lower
 125 section of the valve being received about the lower end of the tube, the spring being passed upon the tube from its other end for making contact with the shoulder 112, the upper section of the valve being then slipped
 130

over the upper end of the tube and threaded to the lower section of the valve.

The assembled tube and valve is then inserted into the lower end of the passage 11, the upper end of the tube being passed through the bearing 93. The branch pipe 79 is then screwed into place in the cross passage 81, and the washer 82 is properly compressed, with the branch pipe located so that its threaded socket 92 extends upwardly.

The lower threaded end of the tube is thereupon threaded into said threaded socket for making a fluid tight joint therewith. The throttle valve 26 is then assembled in said passage. The gland 98 with its packing 100 is adjusted about the tube, and the valve stem 94 with its spring 102 thereabout, threaded into the threaded end of said tube.

The fuel feed port 63 is for the low speed fuel jet of the apparatus, employed when the engine is idling or running at low speeds with little load, the adjustment of this jet being by means of the needle valve 66. The feed ports 78 are for the high speed fuel jets controlled by the needle valve 94, and normally closed by the air valve when the engine is running at such idling speeds or low speeds and little load. The float valve preferably maintains the level of the fluid fuel just below the exit ends of said fuel feed ports.

When starting the engine, the choke valve 17 is substantially closed for limiting the air passage in the carburetor and the throttle valve 26 is opened, with the consequence that there is a rush of a small column of air at high speed through the by-pass passage 15, creating a vacuum immediately above the automatic air valve 105 for aiding in maintaining this air valve seated and producing suction in the by-pass passage 15 past the fluid fuel feed port 63 for discharge of fluid fuel into the air in sufficient proportion to provide a rich mixture for aiding in quick starting of the engine.

When the throttle valve 26 is substantially closed, the volume of explosive mixture passing into the engine decreases, the speed and volume of air passing through the by-pass passage also decreasing and consequently drawing less fluid fuel through the port 63.

The choke valve 17 being opened, a greater volume of air is permitted to pass the same into the passage. Such open relation of the choke valve 17, substantially closed relation of the throttle valve 26, and closed relation of the automatic air valve 105, causes all of a reduced amount of air to pass through the by-pass passage 15, drawing a sufficient amount of fluid fuel therewith for forming an explosive mixture suitable for idling speed of the engine.

When the throttle valve 26 is slightly open, an increased amount of air passes through the by-pass passage and draws an increased amount of fluid fuel therewith through the

port 63 for low speeds and moderate speeds of the engine without substantial load, depending on the extent of moderate openings of the throttle valve 26.

When the throttle is open to greater extent either for heavier loads of the engine or high speeds of the engine, a sufficient amount of air will be drawn through the passage 11 to cause greater or less movement of the automatic air valve 105, dependent on the extent of throttle opening. During the first portion of said opening movement, air will pass through a narrow annular band or space between the seating portion of said valve and the valve seat and adjacent to the by-pass passage, supplementing the air passing through said by-pass passage and complementary to the passage of fluid fuel through the port 63, aiding in supplying properly proportional mixture throughout such moderate engine speeds.

Upon greater opening of the throttle valve, the automatic air valve 105 is actuated to greater extent by the suction from the engine, for exposing the fuel feed port or ports 78, and, in connection with the port 63, supplying greater amount of fluid fuel into said air, dependent on the speed and volume of air passing the same.

The upper end of the automatic air valve is preferably shaped so as to cause passage of air along the tube at the fuel feed port therein, such air being directed away from this port by the upper reversed curvature of the upper end of the automatic air valve, thereby creating a vacuum or suction at or below said port 78 for drawing fluid fuel therefrom into the air for proper mixture therewith and for supplying an explosive mixture of proper proportions for high speed engine conditions.

The spring normally urges closing of the valve 105 and the movement of the valve for opening relation is resisted by said spring.

My improved carburetor provides for a proper proportionate supply of fluid fuel and air for most economical operation for idling speed and throughout the higher ranges of speeds of the engine. The transition from closed relation to open relation of the ports 78 takes place at the moment that the supply of fluid fuel through the port 63 becomes inadequate for wider throttle openings, supplying additional fluid fuel at the critical moment for preventing undue dilution of the explosive mixture.

The walls of all of the passages for the air and for the explosive mixture and for the feeding of a fluid fuel are made of such contour and gradually changing form as to assure stream-line flow of air, fuel and explosive mixture, and smooth and uninterrupted transition from each to the other of the full range of engine speeds.

My improved device is further of simple

construction, readily assembled, of few parts and economical manufacture.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a carburetor, the combination of an air passage having a constricted portion, the wall of said air passage at said constricted portion provided with a valve seat, a by-pass air passage at the side of said valve seat, a fuel feed tube in said first-named air passage, an automatic air valve surrounding said fuel feed tube and co-acting with said valve seat, a fuel feed port in said by-pass air passage at the side of said valve seat and a fuel feed port in said fuel feed tube, said last-named fuel feed port being in said constricted portion of said first-named air passage and normally closed by said automatic air valve, said automatic air valve controlling the feed of fuel through both said fuel feed ports by its relatively open and closed positions with relation to said valve seat, and said automatic air valve arranged to be automatically opened by suction in said first-named air passage.

2. In a carburetor, the combination of an air passage having a constricted portion, the wall of said air passage at said constricted portion having a valve seat, a fuel feed tube in said air passage having a fuel feed port in said constricted portion, an automatic air valve having spaced apart bearings about said fuel feed tube on which it is slidable lengthwise of said fuel feed tube, one of said bearings normally closing said fuel feed port, said fuel feed tube provided with a shoulder, and a spring about said fuel feed tube between said shoulder and said automatic air valve for normally seating said automatic air valve on said valve seat and closing said fuel feed port, said automatic air valve caused to yield by the suction in said air passage.

3. In a carburetor, the combination of an air passage having a constricted portion, the wall of said air passage at said constricted portion having a valve seat, a fuel feed tube in said air passage having a fuel feed port substantially in said constricted portion, an automatic air valve comprising a plurality of inclosing members about said fuel feed tube, one of said members having a valve face coacting with said valve seat, a spring about said fuel feed tube, and means for connecting said enclosing members about said spring, said spring normally seating said automatic air valve on said valve seat and closing said fuel feed port, and said automatic air valve caused to yield to suction in said air passage for opening said fuel feed port.

4. In a carburetor, the combination of an air passage having a constricted portion, the wall of said air passage at said constricted portion having a valve seat, a fuel feed tube in said air passage having a fuel

feed port substantially in said constricted portion, and an automatic air valve of substantially acorn form having its domelike end toward the inlet end of said air passage and its tapering end toward the outlet end of said air passage, the domelike end of said automatic air valve normally closing said fuel feed port, and said automatic air valve caused to yield to suction in said air passage whereby to expose said fuel feed port at said domelike end for causing drawing of fuel out of said port along the lengthwise curvature of said domelike end through said valve seat.

5. In a carburetor, the combination of an air passage having a constricted portion the wall of which is provided with a groove extending lengthwise of said air passage, said constricted portion provided with a valve seat interrupted by said groove, a fuel feed tube in said air passage extending lengthwise of said air passage, a fuel feed port in said groove, a fuel feed port in said fuel feed tube, said fuel feed ports being at substantially the level of said valve seat, and an automatic air valve of substantially acorn form about said fuel feed tube normally seated on said valve seat and having its domelike end toward the inlet end of said air passage and its tapering end toward the outlet end of said air passage, said dome like end normally directing incoming air through said groove across said first-named fuel feed port and normally closing said second-named fuel feed port, and said automatic air valve caused to yield to suction in said air passage for exposing said second-named fuel feed port beyond the middle portion of said domelike end.

In testimony whereof, I have hereunto signed my name.

DONALD F. GINDELE.