Oct. 6, 1931. R. F. ENSIGN 1,826,061

CARBURETOR

Filed July 2, 1927

Fig. 1.

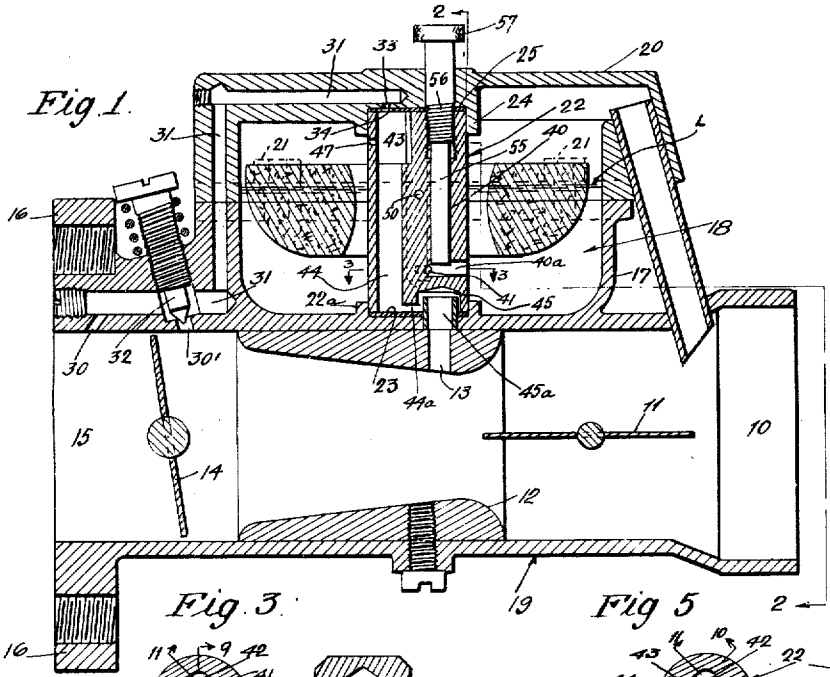


Fig. 3.

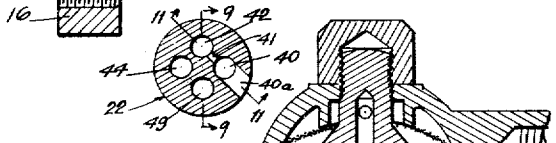


Fig. 2.

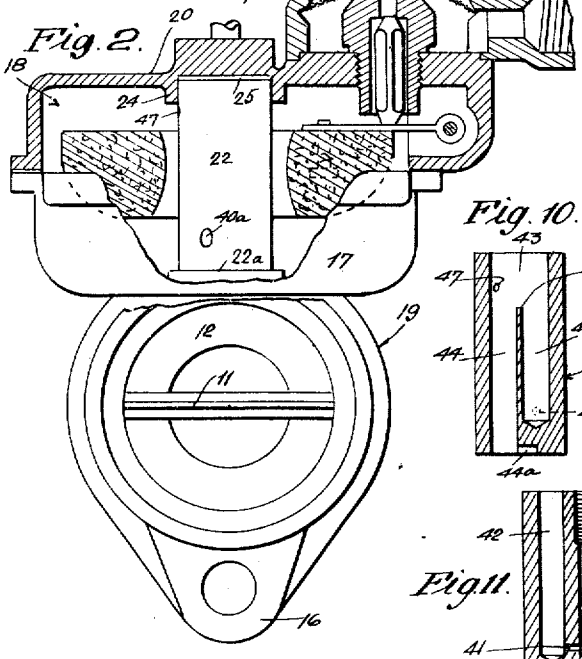


Fig. 5

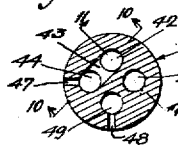


Fig. 7.

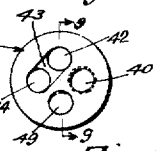


Fig. 6.

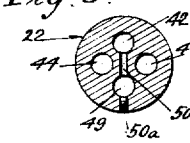


Fig. 4.

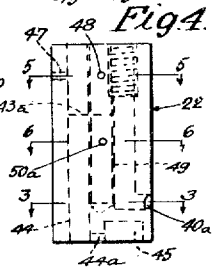


Fig. 10.

Fig. 9.

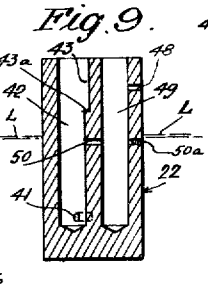


Fig. 8.

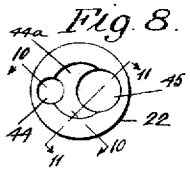
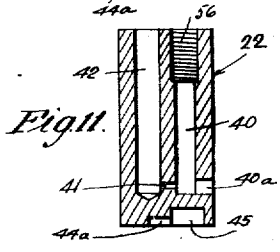


Fig. 11.



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Patented Oct. 6, 1931

1,826,061

UNITED STATES PATENT OFFICE

ROY F. ENSIGN, OF SOUTH PASADENA, CALIFORNIA, ASSIGNOR TO ENSIGN CARBURETOR CO. LTD., OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA

CARBURETOR

Application filed July 2, 1927. Serial No. 203,226.

This invention has to do with carburetors of the general type such as set out in my prior application Serial Number 340,658, filed November 25, 1919, entitled Art of carburetion which matured to Patent 1,658,484 granted Feb. 7, 1928. In a carburetor of that type, wherein fuel is lifted through a riser passage to the upper end of a downwardly extending fuel passage and delivered downwardly through that passage to the mixing chamber, it is an object of the present invention to provide a design and construction which is simple in form and economical to manufacture. One of the characteristic features of the present construction resides in the fact that most of the fuel and air passages are contained in a single passage block which is easily and simply made and assembled with the remaining parts of the carburetor. The nature of the invention, its characteristics and advantages, will be best understood from the following detailed description wherein I set out my now preferred embodiment of the invention, reference for this purpose being had to the accompanying drawings, in which:

Fig. 1 is a longitudinal vertical section showing my improved carburetor;

Fig. 2 is a cross-section and end elevation taken as indicated by line 2—2 on Fig. 1;

Fig. 3 is a horizontal detail section of the passage block on line 3—3 of Figs. 1 and 4;

Fig. 4 is an elevation of the passage block, in the same aspect as that of Fig. 1;

Fig. 5 is a cross-section on line 5—5 of Fig. 4;

Fig. 6 is a cross-section on line 6—6 of Fig. 4;

Fig. 7 is a top plan of the passage block;

Fig. 8 is a bottom end view of the passage block.

Fig. 9 is a longitudinal section on line 9—9 of Figs. 3 and 7;

Fig. 10 is a longitudinal section on line 10—10 of Figs. 5 and 8;

Fig. 11 is a longitudinal section on line 11—11 of Figs. 3, 5 and 8.

In the drawings I show my improvements applied to a carburetor of the Venturi type, although it will be understood that the invention may be applied to carburetors having other kinds of mixing chambers and utilizing other means for creating the fuel feeding depression. The carburetor here illustrated has a body 19 with an air intake 10 in which there may be a choke valve 11. A Venturi tube 12 is placed in the mixture passage as illustrated and has the fuel nozzle or fuel feeding passage 13 through its wall. The usual throttle is shown at 14 adjacent the mixture outlet 15, the body being designed with an attaching flange 16 for attachment to the intake of an engine. The lower half 17 of fuel chamber 18 may be formed integrally with the tubular mixing chamber body 19, the upper half or cap 20 of the fuel chamber being secured on the lower half 17 in any suitable manner, as by the bolts indicated at 21. The vertical passage block 22 is held in place endwise between the two chamber halves 17 and 20, its lower end being seated on the bottom of the chamber within a flange 22*a* and upon a gasket 23; its upper end being seated within the flange 24 and upon a gasket 25. The gaskets being of proper thickness, the passage block is held tightly and securely in place, and its ends make fluid tight fits at the gaskets, when the chamber cap 20 is secured tightly down on the lower chamber half 17.

Immediately outside throttle 14 there is a small suction opening 30 which forms a communication between the mixture outlet 15 and a passage 31 in the wall of the carburetor body. Opening 30′ is controllable by an adjustable valve 32 to adjustably modify the depression in passage 31. Passage 31 extends through the wall of the fuel chamber and ends at a point over the upper end of passage block 22, there being a small opening 33 in the wall of the cap 20, and a corresponding opening 34 in the gasket, that connect passage 31 with the suction chamber 43 in passage block 22.

In its present preferred specific form the passage block is constructed as will now be described. It has extending through it four bores 40, 42, 44 and 49, fuel passage bore 44 extending completely through the block from

end to end. Bore 42, which forms a riser passage, extends down into the block from its upper end, as does also bore 49 which forms an air bleed passage, but neither of these bores extends out through the lower end of the block. At their upper ends bores 42 and 44 are interconnected by a chamber 43 whose bottom 43*a* is above the fuel level, which is illustrated at L in Figs. 1 and 9. The suction orifice 33 communicates with this chamber 43 and thus communicates with the upper ends of passage bores 42 and 44.

Into the lower end of bore 40, and located at a point below the fuel level, there leads a horizontal fuel passage 40*a*. Bore 40 does not form a passage, as do the other three longitudinal bores in the block, but is only a bore for accommodating the valve stem 55 which is screw-threaded at 56 into the upper end of bore 40 and which extends out through cap 20 with a knurled head 57 for manual adjustment. Valve stem 55, being thus adjustable vertically in bore 40, serves to regulate the passage of fuel through the submerged fuel feed orifice 41 which effects communication between bore 40 and bore 42, serving thus to regulate the amount of fuel that is drawn through the orifice 41 and up through the riser passage 42.

Fuel is drawn up through passage 42 by the depression applied to chamber 43. In normal load operation this depression is applied to chamber 43 through the passage 44 which communicates at its lower end with fuel nozzle 13. At idling operation suction is applied to chamber 43 through the passage 31, increased suction being applied to passage 31 through the opening 30 due to the position of throttle 14 during idling, as will be well understood. In whatever manner suction is applied to chamber 43, the fuel that is lifted by that depression through passage 42 is lifted over the point 43*a* and then moves down through passage 44, together with air that enters chamber 43 through the small air orifice 47 from the interior of the fuel chamber. Passing down through passage 44 the fuel (during normal operation mixed with air) passes laterally through a passage 44*a* into a small chamber 45, then passes upwardly over the edge of a nipple 45*a* and thence down through the nipple and through nozzle 13 to the mixing chamber. The passage 44*a*, chamber 45 and nipple 45*a* form in effect a trap formation at the bottom of passage 44, forcing the fuel to flow upwardly just before it moves out into the mixing chamber. During normal operation this trap formation is, in effect, inoperative; but at times during idling operations, when an excess depression is put upon chamber 43, and when an unaerated column of fuel is standing in passage 44, the trap formation operates to prevent upward flow of air through passage 44, the liquid in the column in 44 at that time flowing downwardly under gravity. This peculiarity of operation need not here be detailed as it is explained fully in my said prior application.

The passage bore 49 is bored down from the top of block 22 but is not bored clear through the bottom of the block. At a point above the fuel level there is a small lateral air orifice 48 that leads into passage 49. Another air bleed orifice 50 is located at a level just below fuel level L and extends between passage 49 and passage 42. The plugged hole 50*a* is merely the drill hole necessary for drilling orifice 50. Orifice 48, passage 49 and orifice 50 form a submerged air bleed into the fuel riser passage 42; and this air from passage 50, which enters passage 42 in which the fuel is rising to the overflow point 43*a*, aerates the fuel and helps to lift it over the point 43*a*, acting in the same manner as in an air lift.

The chamber 45 at the lower end of the passage block 22 is formed by boring a short distance up into the block; and the lateral passage 44*a*, which connects chamber 45 with the lower end of passage 44, is conveniently formed by boring up into the lower end of the block with a boring tool of sufficient diameter that the bore of 44*a* runs into the bores of 44 and 45. This will be understood from an inspection of Fig. 8. The bore of chamber 45 being deeper (extending higher) than the bore of the passage 44*a*, and nipple 45*a* extending up into chamber 45 higher than passage 44*a*, results in the trap formation as before described.

Aside from the idling passage 31, the orifice 33, 34, the nipple 45*a* and the fuel nozzle 13, it will be seen that all of the fuel and air passages in this carburetor are contained within the single passage block 22. There is therefore little machine work to be done upon the body parts of the carburetor, most of the machine work of the passage being performed upon the passage block. But the machining operations on the passage block are mainly simple boring operations. The design of the block is such that the block with its larger passage bores may be die cast, leaving only the small orifices to be drilled. The passage block may thus be economically manufactured in large quantities and its assembly with the body parts of the carburetor is simple and easy.

Without limiting my invention to such particular details, but for the purpose only of giving a complete understanding of one operative form, I may say that the drawings show a full size device. Orifice 33 is made with a No. 58 drill; orifices 47 and 48 with a No. 55 drill; and orifices 41 and 50 with a No. 50 drill. These sizes are for kerosene or heavy gasolene as fuel and of course may be modified for other fuels.

I claim:

1. In a carburetor, the combination of a

body having therein a mixture passage and a fuel chamber, a cap for the fuel chamber, a fuel passage leading through the bottom wall of the fuel chamber to the mixture passage, and a passage block confined vertically between the bottom wall and the cap of the fuel chamber, said passage block having vertical bores therethrough forming vertical passages, one of said vertical passage bores extending through the block from end to end and communicating at its lower end with the said passage which leads to the mixture passage of the carburetor, a suction chamber in the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said last mentioned passage bore having communication with the fuel chamber below the fuel level therein, said communication being formed by a lateral fuel orifice, the passage block having also a vertical valve stem bore extending down from its upper end and intersecting said lateral fuel orifice, and a valve stem in said valve stem bore and extending out through the fuel chamber cap.

2. In a carburetor, the combination of a body having therein a mixture passage and a fuel chamber, a cap for the fuel chamber, a fuel passage leading through the bottom wall of the fuel chamber to the mixture passage, and a passage block confined vertically between the bottom wall and the cap of the fuel chamber, said passage block having vertical bores therethrough forming vertical passages, one of said vertical passage bores extending through the block from end to end and communicating at its lower end with the said passage which leads to the mixture passage of the carburetor, a suction chamber in the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said second mentioned passage bore having communication with the fuel chamber below the fuel level therein, the passage block having another vertical passage bore extending down from its upper end, and having an air inlet orifice leading into said third mentioned passage bore at a point above the fuel level and having a lateral orifice leading between said third mentioned passage bore and the second mentioned passage bore at a point just below the fuel level in the fuel chamber.

3. In a carburetor, the combination of a body having therein a mixture passage and a fuel chamber, a cap for the fuel chamber, a fuel passage leading through the bottom wall of the fuel chamber to the mixture passage, and a passage block confined vertically between the bottom wall and the cap of the fuel chamber, said passage block having vertical bores therethrough forming vertical passages, one of said vertical passage bores extending through the block from end to end and communicating at its lower end with the said passage which leads to the mixture passage of the carburetor, a suction chamber in the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said second mentioned passage bore having communication with the fuel chamber below the fuel level therein, said communication being formed by a lateral fuel orifice, the passage block having also a vertical valve stem bore extending down from its upper end and intersecting said lateral fuel orifice, and a valve stem in said valve stem bore and extending out through the fuel chamber cap, the passage block having another vertical passage bore extending down from its upper end, and having an air inlet orifice leading into said third mentioned passage bore at a point above the fuel level and having a lateral orifice leading between said third mentioned passage bore and the second mentioned passage bore at a point just below the fuel level in the fuel chamber.

4. In a carburetor, the combination of a body having therein a fuel chamber and a mixture passage with a throttle controlled mixture outlet, a cap for the fuel chamber, a fuel passage leading through the bottom wall of the fuel chamber to the mixture passage, and a passage block confined vertically between the bottom wall and the cap of the fuel chamber, said passage block having vertical bores therethrough forming vertical passages, one of said vertical passage bores extending through the block from end to end and communicating at its lower end with the said passage which leads to the mixture passage of the carburetor, a suction chamber in the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said second mentioned passage bore having communication with the fuel chamber below the fuel level therein, the passage block also having an air bleed orifice communicating from the interior of the fuel chamber above the fuel level to said suction chamber, and the wall and cap of the fuel chamber having a suction passage communicating with said suction chamber and leading from the mixture outlet adjacent the throttle.

5. In a carburetor, the combination of a body having therein a mixture passage and a fuel chamber, a cap for the fuel chamber, a fuel passage leading through the bottom wall of the fuel chamber to the mixture passage, and a passage block confined vertically between the bottom wall and the cap of the fuel chamber, said passage block having vertical bores therethrough forming vertical passages, one of said vertical passage bores extending through the block from end to end and communicating at its lower end with the said passage which leads to the mixture passage of the carburetor, a suction chamber in

the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said last mentioned passage bore having communication with the fuel chamber below the fuel level therein, the communication of the lower end of the first mentioned passage bore with said passage leading to the mixture passage being formed by a chamber which extends up into the passage block from its bottom, a recess which extends up into the passage block from its bottom to a height less than the height of said chamber, said recess connecting the first mentioned bore with said chamber, and a nipple which extends up into said chamber to a height greater than the vertical extent of said connecting recess.

In witness that I claim the foregoing I have hereunto subscribed my name this 13 day of June, 1927.

ROY F. ENSIGN.

the upper end of the block communicating with said mentioned passage bore and the upper end of another passage bore, the lower end of said last mentioned passage bore having communication with the fuel chamber below the fuel level therein, the communication of the lower end of the first mentioned passage bore with said passage leading to the mixture passage being formed by a chamber which extends up into the passage block from its bottom, a recess which extends up into the passage block from its bottom to a height less than the height of said chamber, said recess connecting the first mentioned bore with said chamber, and a nipple which extends up into said chamber to a height greater than the vertical extent of said connecting recess.

In witness that I claim the foregoing I have hereunto subscribed my name this 13 day of June, 1927.

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CERTIFICATE OF CORRECTION.

Patent No. 1,826,061. **Granted October 6, 1931, to**

ROY F. ENSIGN.

It is hereby certified that the location of the assignee in the above numbered patent was erroneously given as "Los Angeles, California", whereas said location should have been given as Huntington Park, California, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of February, A. D. 1932.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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M. J. Moore,
Acting Commissioner of Patents.

(Seal)