March 29, 1932. F. O. BALL ET AL 1,851,343

CARBURETOR

Filed Aug. 28, 1926

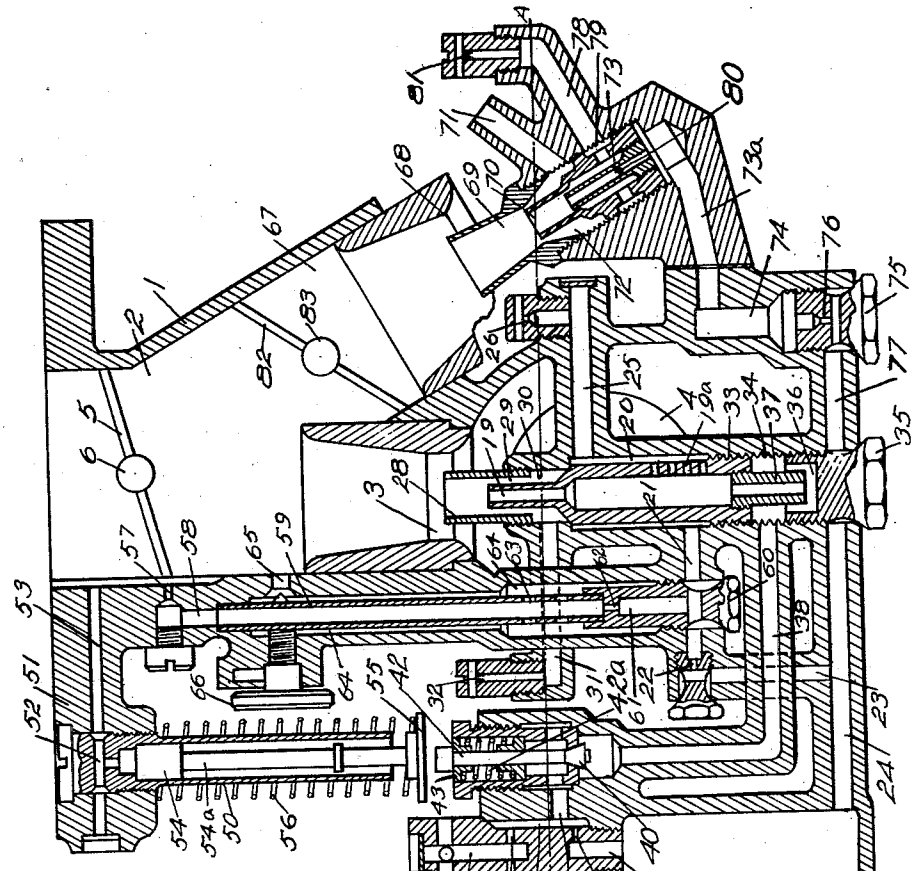

FIG. 1.

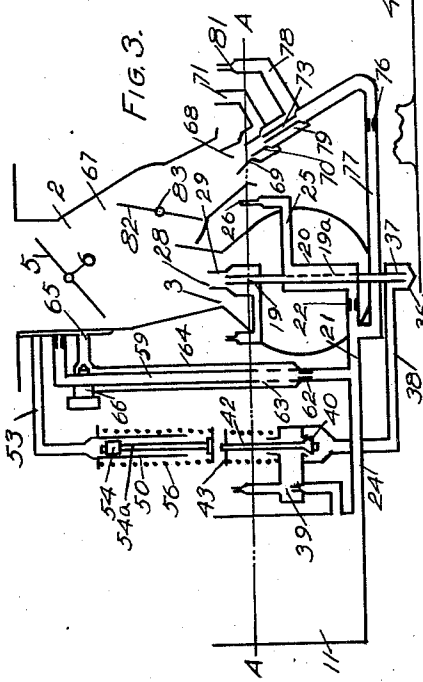

FIG. 3.

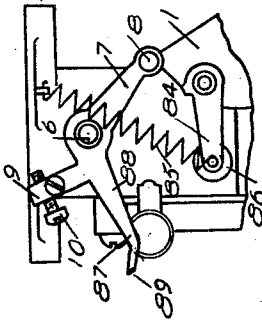

FIG. 2.

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed August 28, 1926. Serial No. 132,082.

This invention involves improved means of controlling the fuel delivery to the carburetor particularly as to the location of the nozzle and the suction passages, the means for enriching the mixture during certain conditions in the operation of the carburetor and to improvements in the structural features of the carburetor, particularly carburetors comprising plural jets. Features and details of the invention will appear from the specification and claims.

The invention is illustrated in the accompanying drawings as follows:—

Fig. 1 shows a central vertical section through the carburetor.

Fig. 2 a front elevation of a portion of the carburetor showing the operating levers.

Fig. 3 a diagrammatic view of the carburetor.

1 marks the carburetor body. This has the usual suction passage 2, primary throat or Venturi tube 3, air inlet passage 4, throttle valve 5, throttle valve shaft or pin 6, throttle valve controlling lever 7, and throttle controlling attaching means 8 in the form of the usual eye to which the usual control mechanism is attached. The throttle lever is provided with the usual stop arm 9 with an adjusting screw 10.

A float chamber 11 is provided with a float 12. The float operates through levers 13 on the valve stem 15 to control a needle valve 16 and the needle valve 16 controls a passage 17 leading from a supply pipe 18. The fuel level is represented at A—A.

A fuel nozzle 19 leads into a well 20 and is connected with the well by a series of openings 19*a* at differing levels. A fuel passage 21 leads to the well, passing through a metering opening 22 in a metered plug and the metered opening is connected with a passage 23 leading to a passage 24. The passage 24 leads to the bottom of the float chamber. Fuel is delivered through these various passages to the well.

Air is also delivered to the well by way of a passage 25, this passage having a metering opening 26. In operation on a quick acceleration, or change in suction effort on the nozzle the fuel built up in the well 20 supplies the added suction effort, thus providing a pick-up which is of sufficient capacity to take care of slight variations. The nature of the pick-up, that is, whether the entire supply of the well is instantly delivered or is delivered gradually through a period is controlled by the location of the openings 19*a*, the fuel level and by the size of the vent orifice 26. The variation in level, however, in the well does not materially change the flow of fuel to the nozzle other than the momentary variation during the pick-up.

A vent tip 28 is arranged around the nozzle and extends upwardly into the throat of the venturi 3. A restricted annular passage 29 is provided between the vent tip and the nozzle and this passage leads to a chamber 30. A passage 31 leads to the chamber 30 and a metering opening 32 leads from the atmosphere to the passage 31. The nozzle 19 has a screw-threaded shoulder 33 at its lower end which is screwed into screw threads 34 in continuation of the walls of the well 20, the shoulder 33 forming the bottom of the well. A plug 35 is screwed in continuation of the wall of the well 20 at its lower end below the nozzle and closes this opening below the shoulder 33. By removing the plug it is possible to readily change the nozzle 19 so as to vary its influence on the performance of the carburetor. It is desirable also to adjust the level of the discharge end of the nozzle without materially disturbing the suction effort on the nozzle and one of the features of this invention is the introduction of the vent tip around the nozzle for accomplishing this purpose. The air reaching the chamber 30 is delivered around the nozzle to the vent tip. No fuel ordinarily reaches the walls of the vent tip and the pressure conditions of the end of the vent tip are carried back in the vent tip to the end of the nozzle. The pressure variations at the end of the nozzle due to the introduction of the vent tip are negligible, that is to say, if the fuel nozzle were arranged in the same relation to the venturi as is the vent tip the pressures on the fuel nozzle would approximate the pressures on the fuel nozzle with the fuel nozzle arranged within the vent tip itself as shown. Thus the vent

tip picks up the fuel from the nozzle at this lower level and assists in spraying it through the vent tip but it does not materially change the suction effort on the nozzle from the suction effort at the venturi. Thus it is possible to change the elevation of the end of the nozzle within the vent tip without disturbing the carburetor adjustments except as to the influence of gravity.

A larger pick-up effect and a convenient step-up is given to the carburetor by the following mechanism: The plug 35 is provided with a cup 36 into which a projection 37 on the nozzle extends. A passage 38 leads from the chamber formed by the cup 36 and the space between the shoulder 33 and the plug to a valve-controlled passage 39. A valve 40 controls the passage 39 and its communication with a chamber 41. A stem 42 extends from the valve through a closure plate 43. A plug 46 extends down through the chamber 41 closing the top and bottom of the same and this plug is provided at its bottom with an opening 47 leading to the float chamber below the fuel level and by a calibrated opening 48 feeds fuel into the chamber 41 and thence into the general passage leading to the fuel nozzle. A passage 44 leads from the chamber 41 to a chamber 45 in the upper part of the plug 46. The plug also is provided with openings 49 leading from the atmosphere to the chamber 45 thus delivering air to the passage. A cylinder 50 is screwed into a flange 51 extending from the carburetor body and this cylinder has an opening 52 at its upper end connecting with an opening 53 leading to the suction passage above the throttle. A plunger, or piston 54 is arranged in the cylinder and is subjected to reduced pressure communicated from above the throttle on the one side and atmospheric pressure on the opposite side. The plunger has a stem 54*a* which extends to below the cylinder and a head 55 is arranged on the lower end of the stem. A spring 56 tends to force the plunger downwardly and the plunger when it is forced downwardly operates upon the stem 42 to open the valve 40. A spring 42*a* yieldingly holds the stem 42 in its upper position so as to close the valve, this spring, however, being of less strength than the spring 56 so that when the suction effort above the throttle is reduced the spring 56 depresses the head 55 and immediately opens the valve 40.

The functioning of this pick-up step-up mechanism is as follows: There is an accumulation of fuel in the cup 36. Upon a reduction of pressure above the throttle and a consequent condition making it desirable for a greater delivery of fuel the valve 40 is opened in the manner above described and air passing through the opening 49 and the various passages immediately throws into the nozzle the fuel accumulated in the cup 36 and the passage immediately above it. The same opening of the valve permits a flow of fuel through the calibrated opening 48 to the passages leading past the valve 40 so that not only is the fuel from the nozzle momentarily augmented but an added amount of fuel is continued to be delivered by way of the metered opening 48 thus providing a desirable step-up device.

The idling jet shown has an opening 57 leading to the suction passage at the edge of the throttle. The jet communicates with a passage 58 which is extended by a tube 59, the tube extending into a well 64. The lower end of the tube 59 extends into a plug 60, the plug being in communication with the fuel passage 21. The plug is provided with an opening 61 which communicates through a metering opening 62 with the tube 59. Openings 63 lead through the bottom of the tube 59 into the well 64. Air is delivered to the well 64 by an opening 65 leading from the suction passage and adjustable by means of a screw 66.

A secondary jet, or carburetor is arranged in a passage 67 leading from the body. This is provided with a venturi 68. A second venturi 69 leads into the throat of the venturi 68. A vent tip 70 leads into the venturi 69. An air passage 71 leads to a chamber 72 between the vent tip and the venturi delivering air in the passage between the vent tip and the venturi. A nozzle 73 leads into the vent tip having a restricted passage between the end of the nozzle and the vent tip. A fuel passage 73*a* leads to the bottom of the nozzle, and from a passage 74. Fuel is metered through a calibrated opening 76 in a plug 75. The plug communicates with a fuel opening 77 leading to the fuel passage 74. An air passage 78 leads to a chamber 79 around the fuel nozzle. This chamber feeds air through the restricted passage between the end of the nozzle and the vent tip and also to the nozzle through a small opening 80. The air passage 78 is metered with a plug having a metering opening 81.

The secondary passage 67 is controlled by a throttle 82. The throttle is mounted on a pin 83 and a lever 84 is fixed on the pin and a spring 85 tends to close the throttle. The lever is provided with a roller 86 which is in the path of a cam end 87 on an arm 88 extending from the throttle lever 7. Upon the full opening of the throttle the cam 87 contacts the roller and opens the throttle of the secondary carburetor.

In order to relieve the operator of the pressure of the spring 85 with the carburetor in full open position a surface 89 is provided at the end of the arm 88 approximately at right angles to a radial line leading from said surface to the axis of the arm so that when said surface is brought on to the roller the arm 88 is relieved of the pressure of the

spring 85 and consequently the operator is relieved of this pressure.

In the functioning of the secondary carburetor upon the opening of the throttle 82 the accumulated fuel which reaches approximately the top of the vent tip is immediately discharged and from this on the fuel is sprayed through the end of the nozzle, the vent tip in the continued operation operating on the nozzle in the secondary carburetor similarly to its operation in the primary carburetor. The double venturis however give an added suction effort at the end of the vent tip and consequently to the fuel nozzle.

What is claimed as new is:—

1. In a carburetor, the combination of a suction passage; a main throttle controlling the suction passage; a primary throat in the suction passage; a nozzle discharging to the primary throat; a secondary throat leading from the suction passage; an auxiliary throttle in the secondary passage; a secondary nozzle discharging to the secondary throat; a main throttle lever controlling the main throttle; an auxiliary throttle lever fixed with the auxiliary throttle; a spring tending to close the auxiliary throttle; and an operating surface on the main throttle lever actuating the auxiliary throttle lever, said operating surface terminating in a relieving surface locking the auxiliary throttle lever in open position against the action of the spring.

2. In a carburetor, the combination of a suction passage; a throttle in the suction passage; a fuel nozzle discharging to the suction passage; a main fuel supply leading to the nozzle; an auxiliary fuel supply passage leading to the nozzle; an air connection leading to the passage; a valve in the auxiliary passage closing off the air connection and fuel supply; a removable plug having restricted openings controlling the air connection and auxiliary fuel supply; devices controlled by a pre-determined variation of pressure in the suction passage above the throttle controlling the valve to open the same as the suction effort through the suction passage above the throttle is reduced; and means for momentarily augmenting the fuel to the nozzle through the auxiliary passage as the valve is opened.

3. In a carburetor, the combination of a suction passage; a throttle in the suction passage; a fuel nozzle discharging to the suction passage; a main fuel supply leading to the nozzle; an auxiliary fuel supply passage leading to the nozzle; an air connection leading to the passage; a valve in the passage closing off the air connection and fuel supply; a removable plug having restricted openings controlling the air connection and auxiliary fuel supply; devices controlled by a pre-determined variation of pressure in the suction passage above the throttle controlling the valve to open the same as the suction effort through the suction passage above the throttle is reduced; and means for momentarily augmenting the fuel to the nozzle through the auxiliary passage as the valve is opened and continuing a supplemental supply through said passage during the period the valve is opened.

4. In a carburetor, the combination of a suction passage; a throttle in the suction passage; a fuel nozzle discharging to the suction passage; a removable cup at the bottom of the nozzle sealed by a nozzle extension into the cup; a main fuel connection leading to the nozzle above the cup; an auxiliary fuel supply and air connection for the cup; and devices connected to the cup adapted to discharge the fuel from the cup at the moment of a change of suction effort through the suction passage above the throttle.

5. In a carburetor, the combination of a suction passage; a throttle in the suction passage; a fuel nozzle discharging to the suction passage; a removable cup at the bottom of the nozzle sealed by a nozzle extension into the cup; a main fuel connection leading to the nozzle above the cup; an auxiliary fuel supply and air connection for the cup; and devices connected to the cup adapted to discharge the fuel from the cup at the moment of a change of suction effort through the suction passage above the throttle, said devices continuing an auxiliary supply of fuel through the cup to the nozzle during a reduced suction effort through the suction passage.

6. In a carburetor, the combination of a suction passage; a throttle in the passage; a fuel nozzle; a fuel well surrounding the nozzle; an air and fuel connection leading to the well; air and fuel connections leading from the well to the nozzle; an auxiliary fuel connection leading to the nozzle below the well; and means controlling said auxiliary fuel connection to augment the flow of fuel to the nozzle through said auxiliary fuel connection upon a reduction of suction effort through the suction passage above the throttle.

7. In a carburetor, the combination of a suction passage; a throttle in the passage; a fuel nozzle; a fuel well surrounding the nozzle; an air and fuel connection leading to the well; air and fuel connections leading from the well to the nozzle; an auxiliary fuel connection leading to the nozzle below the well; and means controlling said auxiliary fuel connection to augment the flow of fuel to the nozzle through said auxiliary fuel connection upon a reduction of suction effort through the suction passage above the throttle, said devices continuing the auxiliary supply of fuel to the nozzle during a reduced suction effort through the suction passage above the throttle.

8. In a carburetor, the combination of a suction passage, a fuel nozzle discharging to the suction passage, a removable cup connect-

ed to said nozzle, a fuel connection leading to the nozzle independently of the cup, an auxiliary fuel supply and air connection leading to the cup and devices leading to the cup through said fuel supply and air connection, effective to discharge fuel from the cup at the moment of a change of suction effort through the suction passage.

9. In a carburetor, the combination of a suction passage, a fuel nozzle discharging to the suction passage, a removable cup connected to said nozzle, a fuel connection leading to the nozzle independently of the cup, an auxiliary fuel supply and air connection leading to the cup, and devices leading to the cup through said fuel supply and air connection, effective to discharge fuel from the cup at the moment of a change of suction effort through the suction passage, said devices continuing an auxiliary supply through said cup to the nozzle during a reduced suction effort through the suction passage.

In testimony whereof we have hereunto set our hands.

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THOMAS M. BALL.