

Feb. 17, 1925.

M. G. CHANDLER

1,526,318

CARBURETOR

Filed Aug. 2, 1920

2 Sheets-Sheet 1

Fig. 1

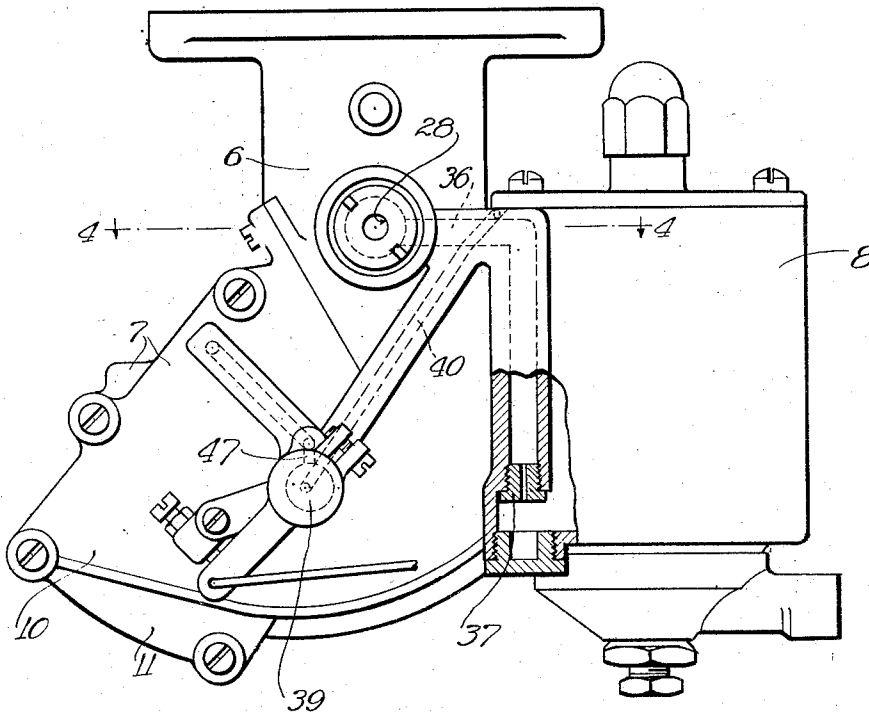


Fig. 5

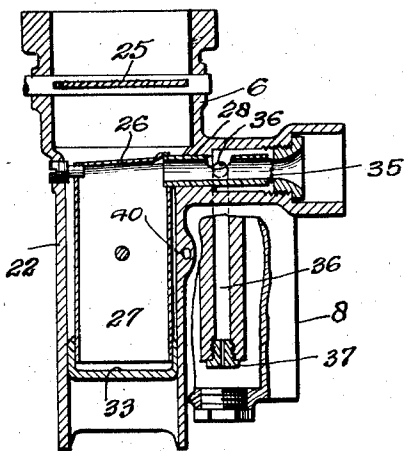
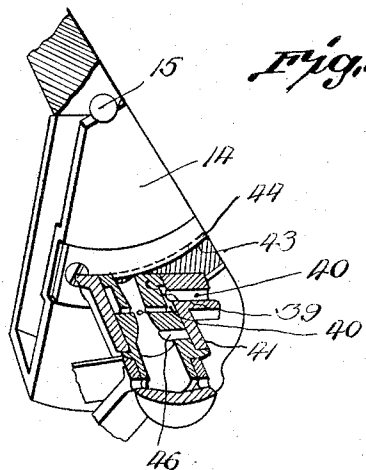


Fig. 3



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Fig. 2

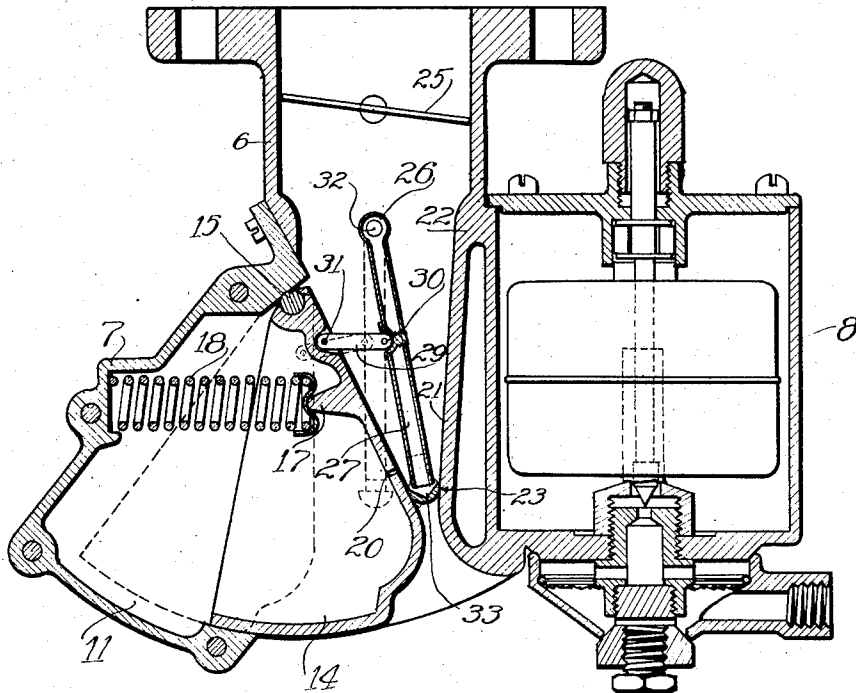
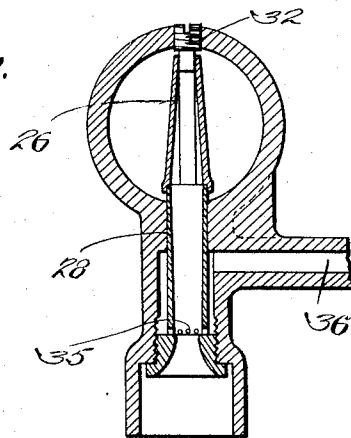


Fig. 4.



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UNITED STATES PATENT OFFICE.

MILFORD G. CHANDLER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO CURTIS B. CAMP, TRUSTEE, OF OAK PARK, ILLINOIS.

CARBURETOR.

Application filed August 2, 1920. Serial No. 400,693.

To all whom it may concern:

Be it known that I, MILFORD G. CHANDLER, a citizen of the United States, and resident of Chicago, in the county of Cook, and State of Illinois, have invented a certain new and useful Improvement in Carburetors, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to carburetors for internal combustion engines. The carburetor to which my invention is applied is arranged for lifting fuel from a low-level supply tank to the float chamber of the carburetor by suction derived from the suction of the engine supplied by the carburetor.

It is well known that the power output of an internal combustion engine is substantially proportional to the actual pressure of the explosive mixture in the intake manifold of the engine. The nearer the pressure of this mixture approaches atmospheric pressure, the greater the power output of the engine, and the further this pressure falls below atmospheric pressure, the less the power output of the engine. The carburetor throttle interposes a restriction to the passage of air into the engine manifold, capable of creating a high depression in the manifold, and thus depriving the engine of power. With the throttle wide open every restriction in the intake passage creates a certain depression in the pressure of the mixture in the intake manifold, and thus deprives the engine of a portion of the power which it would develop were it not for the restricted intake. My invention relates to a carburetor in which means is provided for securing a depression sufficient for lifting fuel from a low-level supply tank to the carburetor without unduly restricting the passage leading into the carburetor.

My invention relates further to a means for delivering fuel to the inrushing column of air at a point near the middle of the column so that the distribution of fuel and air will be substantially uniform. This is accomplished, as will be more fully hereinafter pointed out, by arranging the discharge end of the fuel delivery tube so that it moves across the air intake opening, at substantially one-half the rate that the opening increases in area.

My invention is illustrated in the accom-

panying drawings in which like reference numerals designate like parts throughout the several views, in which—

Figure 1 is a side elevation partially in section;

Figure 2 is a vertical section;

Figure 3 is a perspective of the movable shoe, and its associated cam showing their relation to the fuel lifting Venturi tube, and

Figure 4 is a horizontal sectional view taken on the line 4—4 of Figure 1 showing the mechanism for introducing the fuel into the movable delivery nozzle.

Figure 5 is a section taken on a broken plane to show the fuel passageway from the bottom of the float chamber to the induction passage.

Referring first to Figure 1, the carburetor body comprises two main castings 6 and 7, the casting 6 including the principal portion of the induction passage and also the float or fuel chamber, specially indicated at 8. The casting 7 is a fillet lying between the two wings 10 and 11 which constitute parts of the main casting 6. These two wings are internally milled with parallel inner walls, the spacer 7 serving to hold the free ends of the wings in accurately spaced relation. Between the wings 10 and 11 is a shoe 14 pivoted at 15, the shoe having opposite parallel faces which clear the inner side walls of the wings 10 and 11 by about 2/1000 of an inch, so that the space back of the shoe is substantially enclosed and so that the shoe may act as a piston swinging about its pivot 15 to open and close the induction passage. The shoe is preferably made hollow and between a boss 17 within the hollow of the shoe and the spacer 7 is a spring 18 which tends to hold the shoe in the position to close the induction passage. The shoe is provided with openings 20 leading between the induction passage and the space back of the shoe, through which the suction of the induction passage may be communicated with the space back of the shoe for opening the shoe. The opposite wall 21 of the induction passage is preferably formed substantially semi-cylindrically at the point 22 and gradually blends from this semi-circular cross section into a straight cross section at the point 23, so that the induction passage has a generally flaring shape of substantially the same proportion as a Venturi tube, the shape being

such that no matter what the position of the shoe may be, the point of least cross-sectional area of the intake passage lies approximately at the point 23.

5 Within the induction passage is the usual throttle 25 which is manually controlled for varying the power output of the engine. Slightly anterior to this throttle and centrally positioned within the induction passage is the pivotal end 26 of the movable
10 fuel nozzle 27. This nozzle receives its fuel from a Venturi tube 28, shown in section in Figure 4, the nozzle being pivoted upon the discharge end of the Venturi tube and upon
15 the pivot screw 32 which passes through the side wall of the housing 6. By means of a link 29 pivotally attached to the nozzle 27 at 30 and to the shoe 14 at 31, the nozzle is caused to partake of the movement of the
20 shoe to such an extent as to maintain the deflector 33 which is carried by the movable end of the nozzle 27 substantially midway between the shoe 14 and its opposing wall 23 for all positions of the shoe, the purpose of
25 this being to inject the mixture of fuel and air which passes out of the hollow side of the deflector 33 into the middle of the stream of incoming air.

Fuel is delivered to the ports 35 in the
30 nozzle Venturi tube 28 through a passage 36 which leads to the lower part of the float chamber 8, this passage being provided with a plug 37 having a properly sized opening through it to furnish the right amount of
35 fuel for a combustible mixture. The upper space of the float chamber 8 is maintained at a depression below atmosphere for the purpose of lifting fuel to the float chamber from a low level supply tank. The depression for this purpose is derived from the
40 throat of a very small Venturi tube 39, shown in section in Figure 3, through a communicating passage 40 which connects between the annular space 40' around the
45 vacuum Venturi tube, and the upper space of the float chamber. The Venturi tube 39 is drilled eccentrically, so that when rotated within the housing 41, the discharge end of the Venturi tube will be caused to change
50 its position with respect to the pivot 15 upon which the shoe 14 is supported. The shoe 14 is provided with a cam 43 which is cut so that its edge 44 intersects the discharge opening of the Venturi tube 39. The rota-
55 tion of the Venturi tube 39 causes the edge of the cam to cut off greater or less proportions of the opening to permit greater or less amounts of air to pass through the Venturi tube. By the rotation of this tube, the mixture may be made rich or lean, since the
60 amount of air passing through this small Venturi tube controls the amount of suction on top of the fuel in the float chamber. The greater the suction on the top of the
65 fuel in the float chamber, the less the fuel

feeding differential and, therefore, the leaner the mixture.

The edge 44 of the cam 43 is contoured to suit the particular engine supplied by the carburetor. The spring 18 and other parts
70 of the carburetor are selected to give a substantially constant proportionality of fuel and air, but if this proportionality is not exactly what is desired to provide a perfect
75 mixture under all conditions, then the richness at certain engine speeds can be governed by slight changes in the shape of the cam edge 44, as very few thousandths of an inch taken from or added to this cam changes the
80 mixture proportions a noticeable amount.

The Venturi tube 39 is also provided with an opening 46 adapted to register with an opening 47 when the Venturi tube is rotated to an extreme position. When these two
85 openings 46 and 47 register, an atmospheric communication is completed to a point behind the shoe 14 which relieves the suction back of the shoe and causes the shoe to partially close. This may be done in starting
90 a cold engine, at which time an extremely rich mixture is needed.

In the operation of this carburetor, the suction produced by the rotation of the engine draws air through the nozzle Venturi tube 28 which in turn draws a mixture of
95 fuel into this nozzle through the openings 35. This mixture of fuel and air is carried through the movable nozzle 27 and discharged into the induction passage just above the deflector 33. At the same time,
100 the suction within the induction passage causes a flow of air through the small Venturi tube 39, thus creating a suction on the surface of the fuel in the float chamber for lifting fuel from the low level supply tank
105 to the float chamber. Mechanism within the float chamber of ordinary construction maintains a substantially constant level of fuel therein. When the throttle 25 is opened to a greater extent than that for idling an
110 engine, the increased suction in the induction passage of the carburetor is communicated through the passage 20 to a point behind the shoe 14 and thus causes the shoe to open to such an extent that the suction
115 in the induction passage is prevented from increasing as rapidly as it otherwise would, this being controlled by the pressure of the spring 18 which tends to hold the shoe in its closed position. The openings 20 each
120 being located at the point of high local depression in the induction passage, the suction behind the shoe 14 will increase much more rapidly than the rate of increase of suction in the largest part of the induction
125 passage, thus substantially overcoming the gradually increasing resistance of the spring 18 as it becomes more and more compressed. By reason of this action, the suction in the induction passage of the carburetor at a
130

point just anterior to the throttle 25 is prevented from very materially increasing as the volume of air through the induction passage increases. It is necessary that the suction in the induction passage increase to some extent to insure stability in the moving parts of the carburetor, but it is desirable for securing the best power results that the depression in the induction passage be not too greatly increased for the higher engine demands.

As the shoe 14 opens to its various positions, the swinging nozzle 27 is caused to follow so that the fuel is delivered at the central part of the stream of incoming air, there being substantially the same space maintained between the deflector 33 and the surface 23, as between the deflector 33 and the shoe 14 for all positions of the shoe.

This feature of my invention providing means for delivering fuel to the central part of the incoming stream of air is in no wise limited to a carburetor for lifting fuel from a low level supply tank, and may be used with a carburetor in which the upper surface of the float chamber is open to atmosphere as well as in the present type of carburetor in which the upper space of the float chamber is sealed against external atmosphere.

Although my invention is shown and described with respect to the details illustrated on the accompanying drawings, it is to be understood that I do not wish to be unduly limited thereto, certain modifications being possible without departing from the spirit or scope of my invention.

I claim:

1. In a carburetor, the combination with an induction passage having a fixed wall, of a pivoted shoe constituting an opposite movable wall, a fuel delivery tube pivoted within the induction passage and extending toward the anterior opening into the induction passage, a deflector carried on the end of said tube, and means to cause said tube and its deflector to move about its pivot to hold said deflector and the movable end of the tube substantially midway between the fixed wall of the induction chamber and said pivoted shoe for all of the various positions of said pivoted shoe.

2. In a carburetor for lifting fuel from a low level supply to the level of the carburetor, the combination with a Venturi tube for creating the fuel lifting suction, a shoe constituting a wall of the carburetor induction passage and also serving as a piston, a housing for said shoe serving as a suction chamber for opening the shoe, a passage connecting said housing with the induction passage of the carburetor, a second passage adapted to connect said housing with atmosphere, said second passage being normally closed by a part of said Venturi tube, said Venturi tube being provided with means for opening said second passage when the Venturi tube is rotated to a predetermined position, and means for delivering fuel to said induction passage.

3. In a carburetor, the combination with an induction passage, means for varying the size of the opening through said passage, a fuel and air delivery port located at substantially the most constricted point in said passage, a Venturi tube for creating a mixture of fuel and air, and a tubular connection extending from said Venturi tube in a downward direction to said fuel and air delivery port, substantially as described.

4. In a carburetor, the combination with an induction chamber of a primary mixture passageway lying longitudinally within the induction chamber, a Venturi tube serving as a fuel nozzle discharging into said primary mixture passageway, a discharge orifice for said passageway where the primary mixture discharges into the induction chamber, the point at which the primary mixture enters the primary mixture passageway being nearer the engine to be served by the carburetor than the point at which the primary mixture discharges from the discharge end of the primary mixture passageway, whereby the mixture is caused to flow in one direction in the primary mixture passageway and in the opposite direction in the induction chamber.

In witness whereof, I hereunto subscribe my name this 23rd day of July, 1920.

MILFORD G. CHANDLER.

Witnesses:

EDNA V. GUSTAFSON,
ANDREW WINTERCORN.