

Oct. 31, 1933.

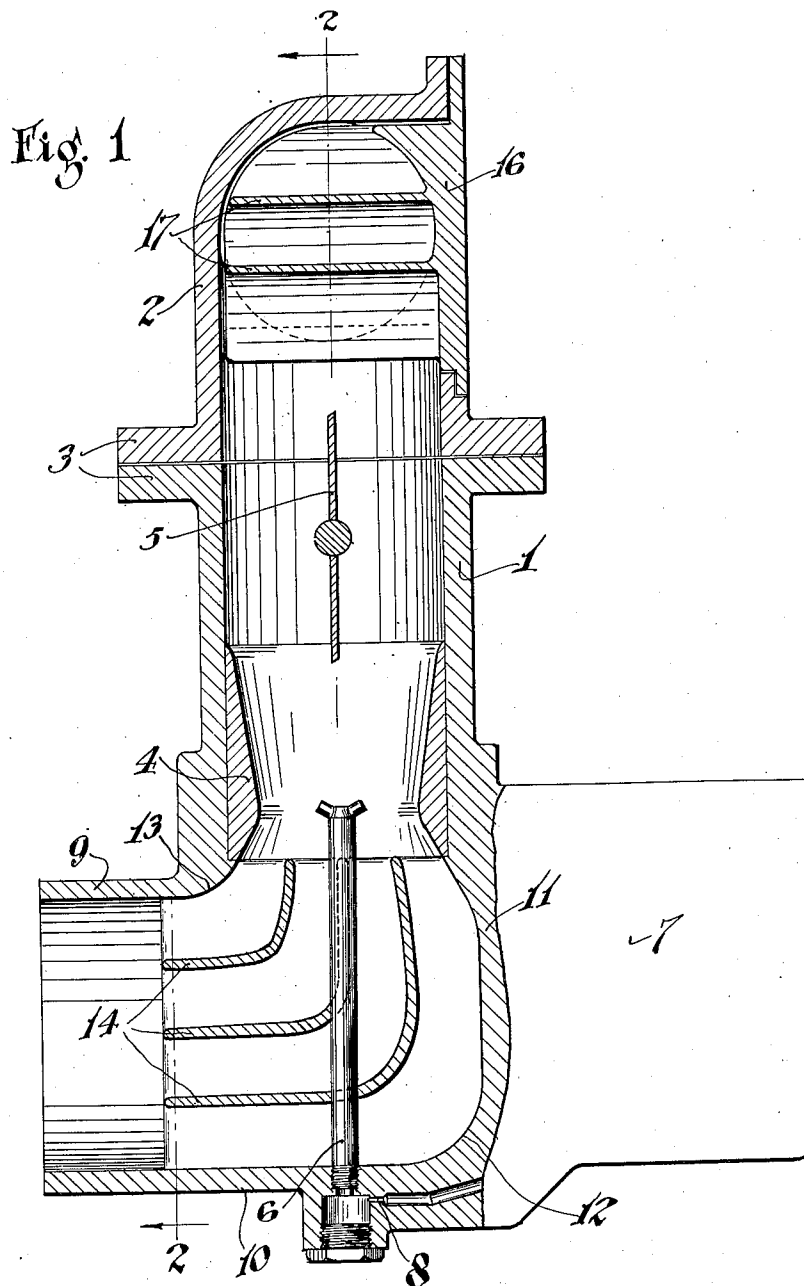
F. C. MOCK ET AL

1,933,380

CARBURETOR

Filed April 21, 1930

3 Sheets-Sheet 1



INVENTORS
Frank C. Mock
Milton E. Chandler
 BY *M. W. McConkey*
 ATTORNEY

Oct. 31, 1933.

F. C. MOCK ET AL

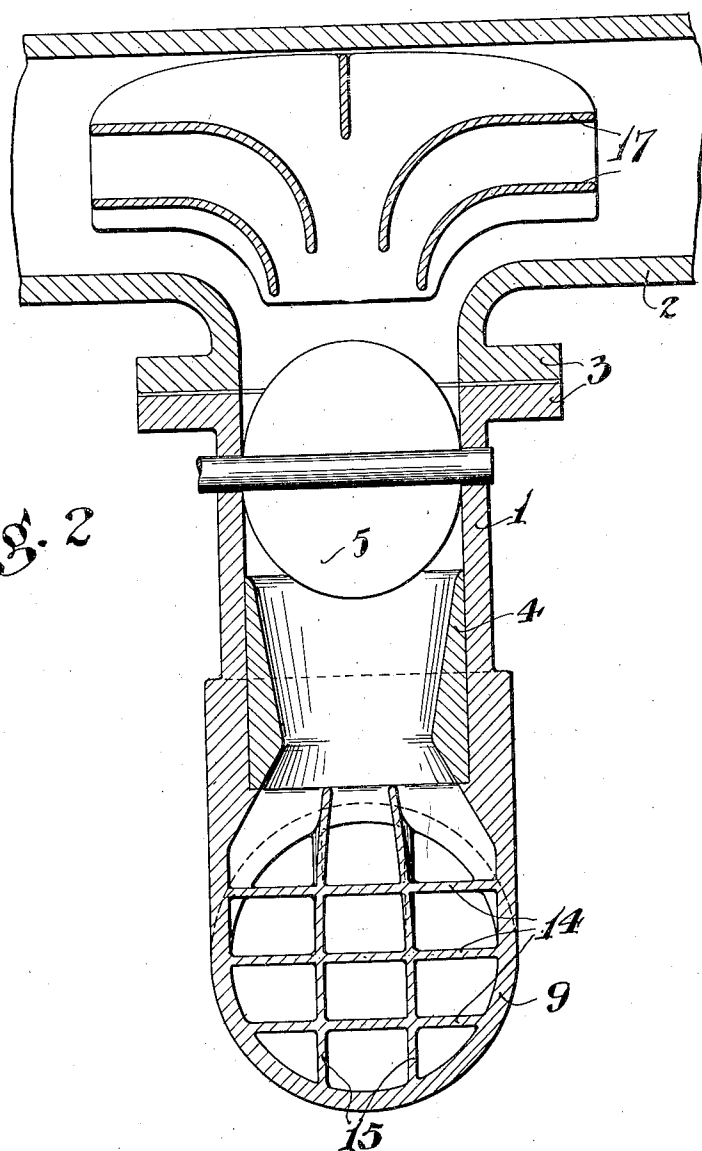
1,933,380

CARBURETOR

Filed April 21, 1930

3 Sheets-Sheet 2

Fig. 2



INVENTORS
Frank C. Mock
Milton E. Chandler
BY *M. W. Conkey*
ATTORNEY

Oct. 31, 1933.

F. C. MOCK ET AL

1,933,380

CARBURETOR

Filed April 21, 1930

3 Sheets-Sheet 3

Fig. 3

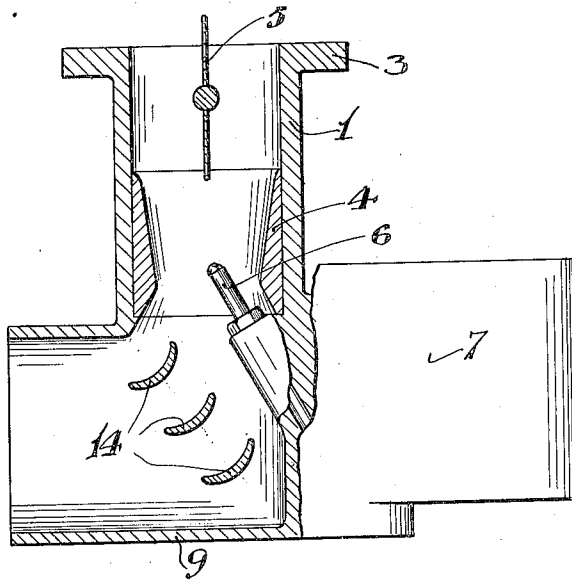
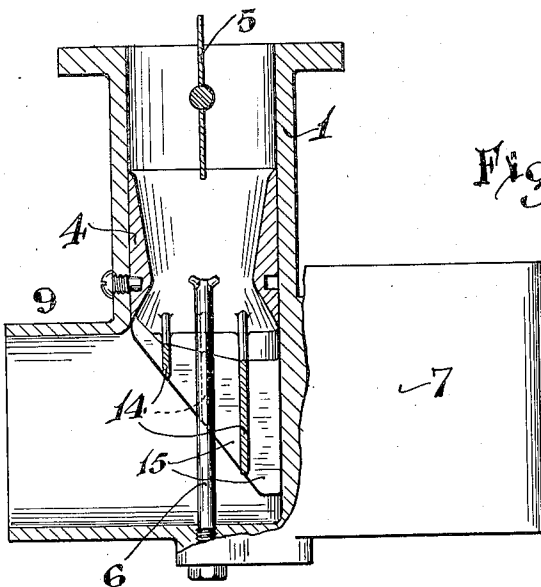


Fig. 4



INVENTORS
Frank C. Mock
Milton E. Chandler
BY *W. W. W. W.*
ATTORNEY

UNITED STATES PATENT OFFICE

1,933,380

CARBURETOR

Frank C. Mock and Milton E. Chandler, Chicago, Ill., assignors to Bendix Stromberg Carburetor Company, South Bend, Ind., a corporation of Illinois

Application April 21, 1930. Serial No. 445,922

8 Claims. (Cl. 261—63)

This invention relates to carburetors and more particularly to means for controlling the path of air flow, and fuel spray flow, in carburetors and in the intake passages of internal combustion engines.

In automobile engine practice in particular, it is common to have the air entrance of the carburetor at an angle to the direction of air flow past the jet. This results in the air flow not filling the air passage, with consequent low capacity of air flow and the formation of eddy currents which have the effect of pulling the fuel spray out of the center of the air stream. Also, if the inequality of air flow extends as far as a point of division in the engine intake manifold, a condition of unequal pressures is formed, which tends still further toward inequality in the air stream distribution.

Such a condition manifests itself in the operation of the engine, as lack of smoothness, very narrow range of permissible mixture proportion, high fuel consumption and an unusual tendency to miss or backfire when the throttle is opened quickly. Also, the engine will usually pull better and smoother with the throttle partly closed than with it full open. All the circumstances causing this are not fully understood, but our experiments have repeatedly shown that the engine performance is very much better when the air stream, as measured by Pitot search tubes, is uniform across the section of the carburetor barrel, and when the fuel spray is then evenly and centrally distributed in the air stream.

An object of our invention is to provide a means whereby the air passing through a carburetor is given a smooth stream line flow of substantially uniform velocity, and free from eddy currents.

A further object of our invention is to provide a means for preventing distortion of currents in the air flow through the passages of a carburetor and intake manifold of the engine.

Another object of our invention is to provide a means whereby the air flow through a carburetor and the intake manifold to the engine is uniform across the section of the air passage.

Still another object of our invention is to provide a means whereby the fuel spray in a carburetor is evenly and centrally distributed in the air stream passing through the carburetor.

With these and other objects in view, which are incident to our improvements, our invention consists in the combination and arrangement of parts hereinafter described and illustrated in the accompanying drawings, in which the same refer-

ence numerals denote similar elements throughout.

Figure 1 is a vertical longitudinal section of a plain tube type of carburetor embodying our improvements;

Figure 2 is a section along the line 2—2 of Figure 1, looking in the direction of the arrows; Figure 3 is a vertical longitudinal section of a modified form of our invention; and

Figure 4 is a similar view of still another modification of our invention.

Referring to Figures 1 and 2, the numeral 1 designates the body of a carburetor, 2 an engine intake manifold which is bolted to the carburetor by means of a usual flanged joint 3. A Venturi tube 4 and throttle valve 5 are positioned in the carburetor body 1, as clearly shown. A multiple jet nozzle 6 is threaded through the bottom wall of the carburetor body 1 so that the jets discharge in the zone of the smallest section of Venturi tube 4. A constant level float chamber 7 supplies liquid fuel to nozzle 6 through a submerged metering orifice 8.

Cast integral with the carburetor body 1, is an intake air horn 9 arranged substantially at a right angle with the body 1. Air horn 9 has a flat square bottom wall 10 and back wall 11 which intersect in substantially a right angle, only the extreme junction angle being rounded off as at 12. It will be noted that the back wall 11 of the air horn is bulged out so as to enlarge the section of the elbow turn to a size greater than the section of the body 1, and that this wall merges with body 1 in a curve which is continuous with that of the venturi 4. The same is true of the inner curved wall 13 joining the upper wall of air horn 9 with body 1. In this way a continuous stream line surface is secured and no projections or interrupting surfaces are presented to disturb the air currents passing through the carburetor. Positioned within the air horn 9 are a plurality of guide vanes or partitions 14 which commence in planes parallel to the axis of air horn 9, continue around the elbow bend, and terminate in planes at right angles to the axis of air horn 9 just below venturi 4. These guide vanes 14 are equispaced at all points so that the channels defined by them are of the same cross section along any intersecting plane.

Intersecting partitions 14 at points equally spaced from the walls of air horn 9, are also provided a plurality of vertical guide vanes or partitions 15, which further equally subdivide the channels defined by partitions 14. Partitions 14 and 15 may be cast integral with air horn 9 and

body 1, as shown in Figures 1, 2 and 3, or they may be separate therefrom, as in Figure 4 where they are formed integral with the Venturi tube.

In Figures 1 and 2, we have shown our preferred embodiment. Here the vanes or partitions used to conduct the air flow around the angle of the air horn are preferably in the form of conjugate hyperbolas to facilitate stream line flow. We have also found that vertical vanes parallel to the plane of the bend are helpful in breaking up vortices that tend to form from the corners where the first-mentioned ribs join the wall of the air passage. The shape and arrangement of these ribs were determined by experimenting with a Pitot search tube while a current of air is forced through the carburetor.

In Figures 3, we have illustrated a modified form of our invention, wherein the partitions 14 are reduced to small curvilinear guide vanes spaced equally across the plane of junction of the horizontal and vertical walls of air horn 9. The channels thus defined by these vanes are of equal cross section.

Referring again to Figures 1 and 2, the numeral 16 denotes a detachable section of the engine intake manifold 2, which section is formed with a plurality of deflecting ribs or vanes 17 which define channels of equal cross section around the bend from the carburetor body 1 to the manifold body 2. These ribs or vanes 17 perform with the outgoing mixture the same function as is performed by partition 14 on the incoming air. By defining smooth stream line channels of equal cross section, a steady flow of uniform velocity is obtained and unequal pressures and eddy currents are eliminated. This helps greatly to prevent liquid fuel deposits on the walls of the intake manifold.

It will be noticed that Figure 1 shows a fuel jet 6 having a submerged metering orifice 8 and larger multiple outlets arranged so that the fuel spray is not directed against the throttle valve 5 and its shaft. This advantageous form of jet can only be used with an air flow so even that the suction is equally balanced on the jet outlets. With the conventional elbow air passage, the suction would not be equal on the two outlets, consequently such a jet would discharge a large but uncertain proportion of its fuel from the outlet located in the highest air velocity.

With the manifold vanes shown in Figures 1 and 2, even and straight discharge of air and fuel spray may be obtained at the point of division of the manifold above the carburetor. Provided the fuel and air stream are equally spread across the outlet of the carburetor, this equality may be maintained by suitably formed guide vanes 17. These vanes extend into the manifold from a plate-like cover 16, the purpose of this construction being to permit more accurate forming of the vanes by casting the piece in a die casting or metallic mold. It is to be noted that the vanes 17 are so located with respect to the throttle valve 5 that a plane including the throttle axis and the axis of the mixing chamber bisects each of the vanes, so that when the throttle is in part open position, the two halves into which it divides the air stream will each be distributed uniformly among the manifold channels formed by the vanes.

By the provision of guide vanes in the air horn

and intake manifold, square elbows may be used with greater efficiency than curved elbows without the vanes. We have also found that the enlarged square elbow shown in the air horn in Figure 1 is more efficient than the usual rounded elbow even without the vanes, although the vanes still further increase its efficiency.

While we have disclosed the preferred form of our invention, we desire it to be understood that we do not intend to be limited to the precise form, which for purposes of illustration, we have shown and described herein, as many changes in details of construction, form and arrangement can be made by those skilled in the art without departing from the spirit of our invention or exceeding the scope of the appended claims.

We claim:

1. In a carburetor having a body and an air horn at an angle, a plurality of curvilinear guide vanes extending from near the entrance to said air horn to said body and subdividing said air horn into a plurality of smooth curvilinear channels whereby a condition of steady uniform air flow is maintained.

2. In a carburetor having a body with an air passage therethrough, an air horn having a square elbow of enlarged cross section as compared to said passage and a plurality of guide vanes subdividing said air passage into channels of substantially equal cross section.

3. In a carburetor having a curved air passage, a plurality of curved guide vanes paralleling the walls of said air passage and subdividing said passage into channels of substantially equal cross section.

4. In a carburetor having a curved air passage, a plurality of curved horizontal vanes paralleling the walls of said passage and subdividing said passage into channels of substantially equal cross section.

5. In a carburetor having an air passage, a plurality of intersecting horizontal and vertical partitions subdividing said passage into channels of substantially equal cross section whereby a steady uniform flow of air through said passage is secured.

6. The combination of a carburetor having a throttle valve and a discharge pipe therefor having a plurality of guide vanes subdividing said pipe into channels, said vanes being in planes perpendicular to the plane of said throttle axis, so that when said throttle is in part open position it does not interfere with the effect of said vanes on the air-fuel mixture passing through said discharge pipe.

7. In a carburetor having a curved air inlet, a plurality of intersecting partitions subdividing said inlet into channels to provide a uniform flow of air through said inlet.

8. In a carburetor having an elongated mixing chamber and a throttle valve pivoted therein, a discharge pipe leading from the mixing chamber, and a plurality of guide vanes subdividing said pipe into channels, said vanes being so positioned that a plane including the axis of the mixing chamber and the throttle axis bisects each of the vanes.

MILTON E. CHANDLER.
FRANK C. MOCK.