March 29, 1927. 1,622,701

F. A. BREWER

MIXING DEVICE FOR INTERNAL COMBUSTION ENGINES

Filed Jan. 3, 1925

FIG. 1.

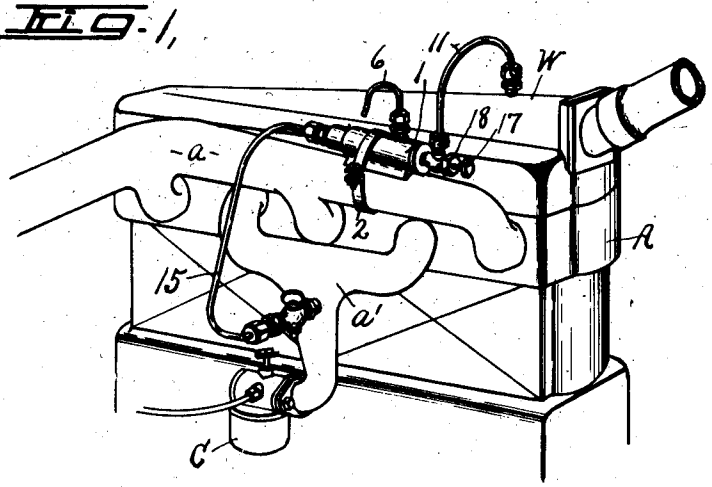
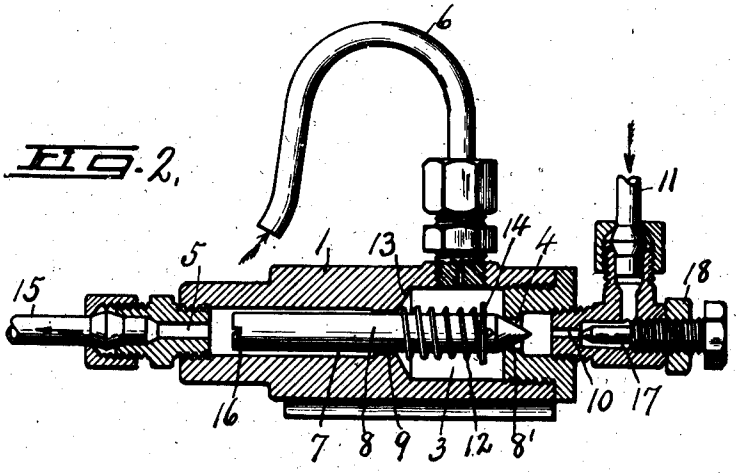


FIG. 2.



WITNESS
H. W. Hurst.

INVENTOR
F. A. Brewer
BY Dennison & Thompson
ATTORNEYS

Patented Mar. 29, 1927. 1,622,701

UNITED STATES PATENT OFFICE.

FRANCIS A. BREWER, OF EASTWOOD, NEW YORK.

MIXING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

Application filed January 3, 1925. Serial No. 399.

This invention relates to a device controlled by the suction in the intake manifold for introducing and mixing extra air and moisture with the fuel in transit from the carburetor to the combustion chambers of the cylinders of an internal combustion engine and refers more particularly to the means for controlling the mixture of air and moisture in transit from the water jacket of the engine to the intake manifold.

The main object is to provide a simple, compact and efficient device of this character adapted to be detachably mounted upon the exhaust manifold of the engine and connected by restricted passages to the intake and to the water jacket of the engine, and also by another restricted passage to the atmosphere whereby the suction produced in the intake manifold serves to draw limited quantities of air and moisture into a suitable mixing chamber, and thence into the intake manifold to mingle with the fuel in transit to the combustion chambers of the cylinder for the purpose of reducing to a minimum the collection of carbon and for removing such carbon as may be collected upon the pistons, or interior of the cylinders, and in and around the poppet valves usually employed in engines of this character.

The specific object is to provide the device with a horizontally extending mixing chamber with a restricted air inlet in constantly open communication with the atmosphere and to also provide the opposite ends of the mixing chamber with horizontally alined ports, one of which communicates with a source of moisture supply, such as the water jacket of the engine, while the other is connected to the intake manifold between the throttle of the carburetor and valve ports of the engine, whereby the suction from the engine serves to draw the mixture of air and moisture from the mixing chamber into the fuel intake manifold for additionally supporting the combustion of the fuel and reducing the carbon content of the products combustion.

Another specific object is to control the mixture by a single valve extending horizontally through the mixing chamber in axial alignment with the opposed ports and normally with one end controlling the inlet port and the other end extending toward the mixture outlet port so as to be readily responsive to varying suction pressures in the intake manifold.

A further object is to reduce the size of the portion of the mixing chamber between the air inlet and mixture outlet so as to form with the adjacent portion of the valve extending therethrough a restricted passage for said mixture in transit to the outlet and thereby to control the amount of moisture and air passing to the outlet by a single needle valve acting automatically under the varying degrees of suction in the intake manifold.

Other objects and uses relating to specific parts of the device will be brought out in the following description.

In the drawings:

Figure 1 is a perspective view of a portion of an internal combustion and my improved mixing device operatively connected thereto.

Figure 2 is an enlarged, longitudinal, vertical sectional view of the same device detached from the engine, parts of the connections between said device and the water-jacket and manifold being broken away.

As illustrated this device comprises a valve case —1— secured by a clamp —2— to the upper surface of an exhaust manifold —*a*— so as to extend upwardly and rearwardly in a substantially horizontal plane.

This valve case is provided with a mixing chamber —3— and opposite end ports —4— and —5— at opposite ends of the mixing chamber which, in turn, is provided with a restricted air inlet —6—.

The end of the mixing chamber adjacent the port —4— is relatively large as compared with the opposite end which is reduced in diameter to form a guide opening —7— for receiving and guiding a horizontal longitudinally movable valve —8— which is co-axial with and between the ports —4— and —5— and has one end tapered at —8′— to control the port —4—.

This valve —8— extends from the port —4— through the larger portion of the mix-

ing chamber —3— and into the smaller end thereof which smaller portion is of only slightly greater diameter than the diameter of the valve so as to form a restricted passage —9— between and around the valve lengthwise of the reduced portion —7— and extending from the larger portion of the mixing chamber —3— to the port —5—.

The port —4— is connected by a restricted passage —10— and a pipe —11— to the upper portion of the water-jacket —W— where there is more or less watery vapor for supplying moisture through said restricted passage —10— and port —4— to the mixing chamber —3—.

The valve —8— normally closes the port —4— and is yieldingly held in its closed position by a coiled spring —12— which surrounds the portion of the valve within the larger portion of the mixing chamber—3— and has one end abutting against the shoulder —13— at the junction of the larger portion with the smaller portion of the mixing chamber and its other end engaged with a shoulder —14— on the valve.

The restricted port —5— is connected by a pipe —15— to the fuel intake manifold —*a'*— of the engine —A— between the throttle valve of the carburetor —C— and valve ports of the engine so that the suction produced by the action of the engine pistons will operate through the pipe —15— and port —5— to create similar suction in the reduced end of the mixing chamber —3— for opening the valve —8— in the direction of the mixture outlet port —5—.

The end of the valve adjacent the port —5— is provided with a diametrically extending slot —16— to prevent any possibility of closing the port —5— by said valve in case it should be drawn against the adjacent end of the port.

A needle valve —17— is adapted to be set at will to vary the amount of moisture passing through the restricting passage—10— but is always open more or less and held in its open position by a lock nut —18—.

The arrangement of the valve —8— and ports —10—, —4— and —5— in co-axial relation and in a horizontal position is of considerable advantage in that the moisture floats in a direct path along the exhaust manifold —*a*— and, therefore, the entire length of the valve case —1— to enable it to be heated and thereby vaporized in transit between the moisture intake port —4— and mixture outlet port —5— while the horizontal position of the valve permits it to have a more or less floating movement in its restricted guide passage —9— and therefore causes it to respond more quickly and easily to the slightest variations in the degree of suction in the intake manifold.

Another advantage of this co-axial arrangement of the valve —8— and ports —4— and —5— is that the valve opens in the direction of movement of the mixture as produced by the suction of the engine.

Operation.

Assuming that the pipes —11— and —15— are connected in the manner described to the upper portion of the water-jacket and intake manifold of the engine and that the air inlet —6— is open to the atmosphere then as the engine is operated the suction produced by the pistons in the mixing chamber —3— tends to draw the atmospheric air through the restricting passage —6— into said mixing chamber and simultaneously to open the valve —8— and to draw moisture from the water-jacket through the pipe —11— and ports —10— and —4— into said mixing chamber to mix with the air so that the mixture may be drawn through the outlet —5— and thence into the poppet valve chambers and combustion chambers of the engine through the intake manifold —*a'*— for additionally supporting combustion and preventing the formation of carbon in the engine cylinders.

It is, of course, understood that the restricted air passage —6— and also the restricted guide passage —9— for the valve —8— are so proportioned that the slightest degree of suction in the mixing chamber causes a corresponding opening of the valve and that the amount of opening of said valve will depend upon the degree of suction.

What I claim is:

1. A moisture and air mixing device for internal combustion engines, comprising a horizontally extending valve-case having a lengthwise mixing chamber provided with co-axial end ports and an intermediate restricted air inlet constantly open to the atmosphere, means for connecting one of said ports to a source of moisture supply, means for connecting the other port to the fuel intake manifold of the engine for producing suction in the mixing chamber, a valve extending lengthwise of and within the mixing chamber co-axial with said ports and controlling the moisture inlet port independently of the suction port and air inlet, said valve being adapted to be opened by suction toward the suction port, and a spring for closing said valve when the suction ceases.

2. A moisture and air mixing device for internal combustion engines, comprising a horizontally extending valve-case having a lengthwise mixing chamber provided with co-axial end ports and an intermediate restricted air inlet constantly open to the atmosphere, means for connecting one of said ports to a source of moisture supply, means for connecting the other port to the fuel intake manifold of the engine for pro-

ducing suction in the mixing chamber, a valve extending lengthwise of and within the mixing chamber co-axial with said ports and controlling the moisture inlet port independently of the suction port and air inlet, said valve being adapted to be opened by suction toward the suction port, and a spring for closing said valve when the suction ceases, the end of the valve nearest the suction port being provided with a transverse slot to prevent closing of the suction port in case the valve should be drawn against the same.

In witness whereof I have hereunto set my hand this 20th day of December, 1924.

FRANCIS A. BREWER.