Oct. 30, 1934. H. C. DUNCAN 1,978,702

GAS MIXING DEVICE

Original Filed Oct. 5, 1931

Fig. 1.

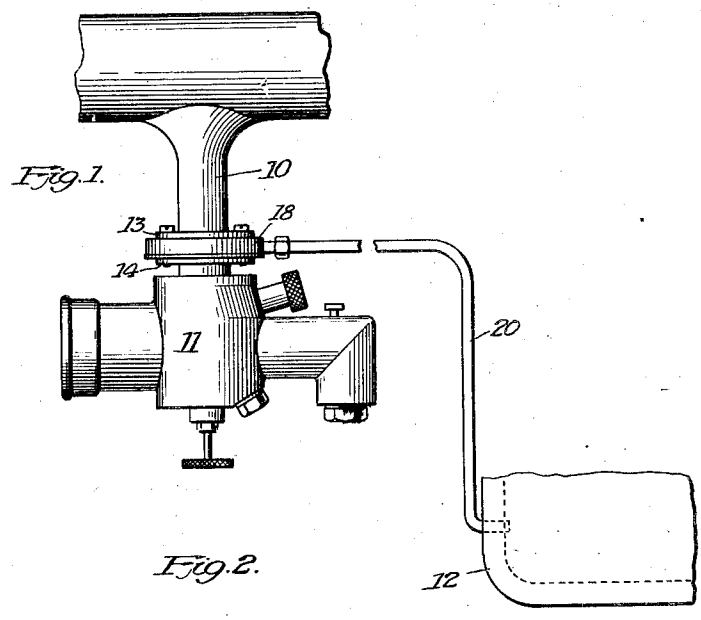


Fig. 2.

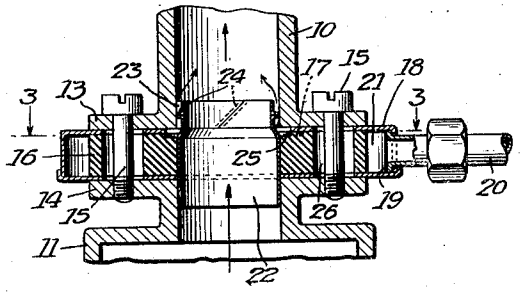
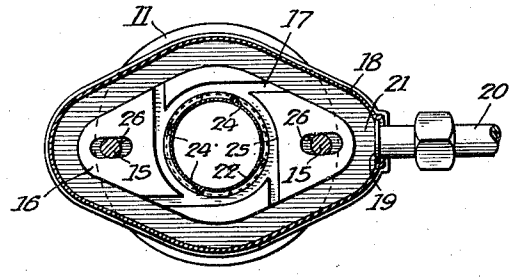


Fig. 3.



Inventor:
Harry C. Duncan.
By Murray & Murray
Attys.

Witness:
R B Davison.

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UNITED STATES PATENT OFFICE

1,978,702

GAS MIXING DEVICE

Harry C. Duncan, Chicago, Ill.

Application October 5, 1931, Serial No. 566,892
Renewed January 25, 1934

5 Claims. (Cl. 48—180)

My invention relates to internal combustion engines and particularly to an improved mixing device for facilitating the oiling of the upper cylinder walls and for improving the carburetion of the fuel.

I am aware that it is old to deliver oil laden air from the engine crank case to the carburetor intake and to the intake manifold or induction pipe with the object of accomplishing the results heretofore described. To my knowledge none of the arrangements heretofore suggested has been successful or even satisfactory; some have been reasonably satisfactory in warm weather but actually detrimental in cold weather. Others have been entirely unsatisfactory due to an imperfect conception of the problem or inability to correlate the different instrumentalities. For example, in some instances the oil laden air has been conducted by a pipe from the crank case to the neck of the intake manifold and there delivered in a solid stream directly across the flow of carbureted air. This has a very deleterious effect on the quality of the charge, particularly for the reason that there is no complete mixture of the carbureted air and the oil laden air and in a multicylinder engine, one cylinder may receive a large proportion of uncarbureted air resulting in the delivery of little or no power from that cylinder. Other suggestions have included the use of a mixing fan that is caused to rotate by the travel of fluid through the carburetor. This likewise has numerous objections such as interference with the normal intake capacity and the fact that at slow speeds the fan will not rotate at all or so slow as to be useless.

An important consideration for the success of a device of this character is the exact proportioning of the quantity or volume of oil laden air that is drawn into the engine and this can only be done by the proper proportioning of the passages through which the oil laden air is delivered to the manifold; in other words, these passages should be designed to deliver the requisite small amount in accordance with the displacement of the engine; this for the reason that too great a quantity of oil laden air will interfere with the carburetion and too small a quantity will of course, defeat the purpose for which it is used. Furthermore, the manner of delivery of the oil laden air is of the utmost importance. I have found that it should be delivered in a whirling motion and not immediately injected into the flowing body of carbureted air thereby disturbing the flow, but caused to whirl around the outside of the induction pipe and become more thoroughly mixed as it travels and is broken up at the branches of the manifold. In this manner I have secured most excellent results at all speeds and all temperatures, both in aviation and automobile motors.

The invention will be more readily understood by reference to the accompanying drawing, in which:

Fig. 1 is a side elevation somewhat diagrammatic in character, illustrating the manner of applying my device to an internal combustion engine;

Fig. 2 is a vertical sectional view through the device, and

Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2.

In the drawing I have illustrated an intake manifold or induction pipe 10 and carburetor 11 and an engine crank case 12.

The device of my invention is intended to be clamped between the attaching flanges 13, 14 of the intake manifold and the carburetor respectively, using bolts 15 that may be slightly longer than those theretofore used for clamping these two parts together. The device consists of a spacer member 16 having a central opening registering with the opening in the induction pipe and carburetor, the upper face of the spacer having a plurality of tangential grooves 17 therein, the size and number of the grooves determining the volume of oil-laden air that is to be delivered to the engine. The spacer is enclosed within a sheet metal casing having an upper portion with a depending flange 18 and a lower cover plate 19 soldered or otherwise joined to the flange 18. The casing has a pipe 20 connected thereto, the pipe leading to the engine crank case, as shown in Fig. 1. The casing is somewhat larger and wider than the spacer 16 thereby providing a distributing chamber 21 around the periphery of the spacer, which chamber is open to the grooves 17. A thimble or sleeve 22 is pressed into the opening in the spacer, the sleeve being of thin sheet metal and projecting beyond the two sides of the device thereby acting as a centering or positioning means. The lower projecting end as shown in Fig. 2 snugly fits the opening in the carburetor while the upper end is of somewhat smaller diameter thus leaving a space 23 between it and the walls of the induction pipe. In order to properly position the device in spaced relation from the walls of the pipe, I provide a plurality of diagonally disposed ribs

24 on the reduced portion, these ribs snugly fitting the surface of the induction pipe. At the inner ends of the grooves 17 an annular groove 25 is formed in the spacer 16, thus providing a clear open passage around the sleeve and thence upwardly along the inside walls of the induction pipe. Thus the oil-laden air admitted through the pipe 20 into the chamber 21 is distributed through the various tangential passages and delivered in a whirling motion upwardly and along the walls of the induction pipe. There is thus no interference with the flow of the carbureted air and the mixture of the oil laden air therewith will proceed in a proper manner.

In order to adapt the device to different flange spacing I form the openings 26 for the bolts 15 somewhat larger than the diameter of the bolts, although this is unnecessary where the device is designed for any particular make or size of engine.

By properly designing the delivery passages and by suitably clamping the device in place to avoid air leakage it will be found to operate successfully at all speeds and at all temperatures.

The exact form and arrangement of the parts is not essential and modifications may be made without departure from the spirit of my invention.

I claim:

1. A device adapted to be clamped between a carburetor outlet and an induction pipe inlet, comprising in combination, a spacer having a central opening of a diameter corresponding to the diameter of the opening in the induction pipe and provided with grooves on one face extending from the periphery to the central opening, a casing surrounding said spacer and closely fitting over the grooved face of the spacer, said casing providing a distributing chamber, a pipe connected to said chamber and adapted to communicate with the crank case of an engine, and a sleeve projecting into the induction passage and of slightly less diameter than said passage and provided with exterior ribs for spacing the sleeve from the walls of the passage.

2. A device adapted to be clamped between a carburetor outlet and an induction pipe inlet, comprising, in combination, a spacer having a central opening of a diameter corresponding to the diameter of the opening in the induction pipe and provided with grooves on one face extending from the periphery to the central opening, a casing surrounding said spacer and closely fitting over the grooved face of the spacer, said casing providing a distributing chamber, the chamber being adapted to be connected to the crank case of an engine, and a sleeve projecting into the induction passage and of slightly less diameter than said passage and provided with exterior ribs for spacing the sleeve from the walls of the passage.

3. A device adapted to be clamped between a carburetor outlet and an induction pipe inlet, comprising, in combination, a spacer having a central opening of a diameter corresponding to the diameter of the opening in the induction pipe and provided with a distributing chamber, a pipe connected to said chamber and adapted to communicate with the crank case of an engine, a sleeve projecting beyond the two sides of the spacer, one projecting portion closely fitting the discharge opening of the carburetor, the other projecting portion being of slightly reduced diameter and projecting into the induction pipe, the space between the reduced portion and the walls of the induction pipe being open to said distributing chamber, and means on the surface of said reduced portion for spacing the same from the walls of the pipe.

4. A device adapted to be clamped between a carburetor outlet and an induction pipe inlet, comprising, in combination, a spacer having a central opening of a diameter corresponding to the diameter of the opening in the induction pipe and provided with a distributing chamber, a pipe connected to said chamber and adapted to communicate with the crank case of an engine, a sleeve projecting beyond the two sides of the spacer, one projecting portion closely fitting the discharge opening of the carburetor, the other projecting portion being of slightly reduced diameter and projecting into the induction pipe, the space between the reduced portion and the walls of the induction pipe being open to said distributing chamber, and volute ribs on said reduced portion for effecting a whirling motion of fluids and for spacing the parts.

5. A device adapted to be clamped between a carburetor outlet and an induction pipe inlet, comprising in combination a spacer having a central opening adapted to register with the opening in the induction pipe and also provided with grooves communicating with said opening and opened to the exterior of the spacer, a casing completely surrounding said spacer and providing a chamber around the exterior of the spacer, a pipe connected to said casing for the admission of fluids to said chamber, and a centering sleeve projecting above and below said spacer for centering the device relative to the carburetor and induction pipe.

HARRY C. DUNCAN.