Aug. 9, 1927. 1,638,585

A. L. LATHROP

MIXING DEVICE

Filed July 25, 1924

Fig. 1.

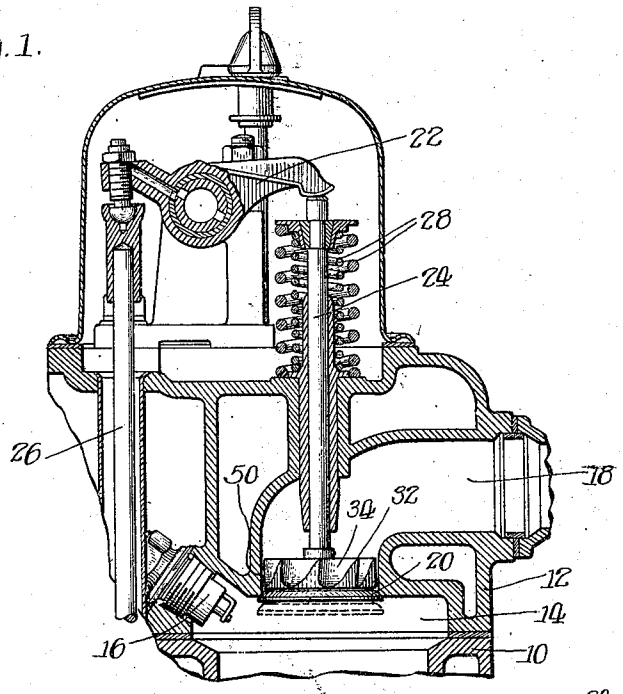


Fig. 2.

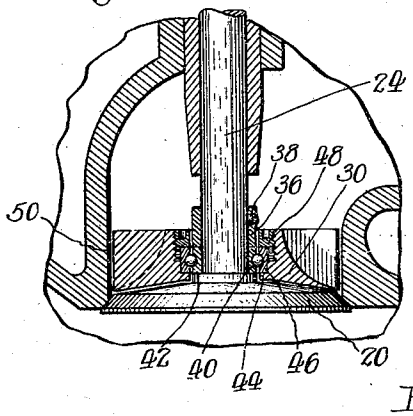


Fig. 3.

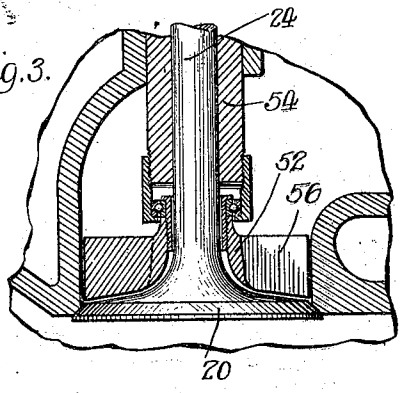
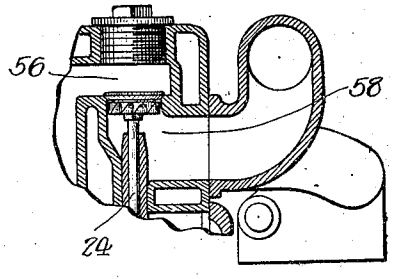


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED L. LATHROP, OF WAUKESHA, WISCONSIN.

MIXING DEVICE.

Application filed July 25, 1924. Serial No. 728,092.

My invention relates to means for getting the explosive mixture into the combustion chamber itself in the best possible condition with a minimum of operations performed thereon prior to its entrance.

Another primary object of the invention is to accomplish such delivery with a relatively cheap and simple means, which, moreover, can readily be installed in engines at present in use.

Further objects and advantages of the invention will become apparent as the description proceeds.

In the accompanying drawings:

Fig. 1 is a transverse section through part of an internal combustion engine, indicating a construction according to the invention;

Fig. 2 is an enlarged detail section through the atomizer proper;

Fig. 3 is a similar section of a modified construction; and

Fig. 4 is a section similar to Fig. 1 for an L-head engine.

In the embodiment of the invention selected for illustration in Figs. 1 and 2, the cylinder casting 10 is surmounted by the usual head casting 12, cooperating with the cylinder to define a combustion chamber 14, receiving a spark plug 16. Inlet passage 18 is controlled by valve 20 actuated in the usual or any preferred manner, as for instance by rocker arm 22 engaging the stem 24 and receiving movement from the tappet rod 26, the valve being held seated by suitable springs 28.

Carburetors of remarkable reliability and accuracy so far as control of the ratio of fuel to air, are well-known to the art, but the carburetor itself has yet to solve the problem of always volatilizing all the fuel, or at least atomizing it so finely that it passes into the combustion chamber 14 in properly atomized condition, under all conditions of temperature of fuel and air and for all fuels.

Inequalities of distribution between different cylinders, the introduction of fuel into the combustion chamber in particles too large to burn properly, and the still more serious defect in operation of accumulated slugs of liquid fuel, a phenomenon commonly known as "loading" are prolific sources of trouble. Centrifugal separating devices and means for heating part or all of the mixture, have been resorted to but these are far from satisfactory or reliable.

According to the preferred manner of practicing my invention, I merely secure a sufficiently intimate mixture of fuel and air in the carburetor to assure the mixture reaching the inlet passage 18 without material change in the mixture ratio. Then as the mixture passes through the opening around the inlet valve into the combustion chamber, it is finely atomized and sprayed directly into said chamber. The elimination of hot spots and tortuous counter-flow passages in the inlet manifold facilitates delivering a uniform mixture into passage 18, and the final atomizing is performed only as the mixture enters the combustion chamber, where it will be most effective. It should also be noted that there is no preliminary heating of the mixture required, which contributes to the volumetric efficiency, and that the atomized liquid fuel, will impinge on the walls of the combustion chamber to be volatilized with a minimum of heating of the gaseous portions of the mixture. This also provides a cooling effect right at the source of heat, which, although relatively small in amount, is a much more direct relief than the cooling by conduction through the metal walls of the combustion chamber.

The atomizer illustrated in the drawings is a spinner 30 having a plurality of radial blades 32 separated by pockets 34 with sides inclined, so that the impact of the incoming mixture will set the device into very rapid rotation about its axis and constitute it an effective atomizer for liquid fuel particles in the mixture. Under the repeated impact of the mixture during the suction stroke, the spinner revolves rapidly at all times when the valve 20 is closed as well as when it is open. To facilitate in maintaining the speed of the spinner, I prefer to provide an anti-friction mounting as illustrated in Fig. 2. Retaining ring 36 held by set screw 38 clamps the inner ball race 40 against the shoulder 42 on the valve stem. The outer ball race 44 is similarly clamped between a shoulder 46 on the spinner 30, and a retaining ring 48. The spinner is preferably made of some light aluminum alloy or pressed steel, to facilitate actuation thereof by the incoming gases. The clearance at 50 can be made very small, and it will be obvious that while the valve is closed, any liquid particles of material size will spread out over surface 50, and be either volatilized by the heat of said surface, or positioned where

the next intake stroke will wipe them off into the combustion chamber.

In Fig. 3 I have indicated a modified construction, in which runner 52 is suitably mounted on guide sleeve 54 for valve stem 24. As this runner does not move down with the valve head and operate as a deflector to spread the gases out radially, it is preferably provided with blades 56 defining passages extending clear through the same axially. This form of device differs from that illustrated in Fig. 2 chiefly in that the cooling effect of liquid particles is delivered more to the back of valve head 20, than to the walls of the combustion chamber.

Fig. 4 indicates the use of a spinner according to Fig. 1 on the valve of an L-head engine, having a lateral extension 56 in the combustion chamber, and an upwardly directed intake passageway 58.

Without further elaboration, the foregoing will so fully explain my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service, without eliminating certain features, which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. A mixing structure for internal combustion engines comprising a fluid inlet duct terminating in a cylindrical outlet passage, a valve disc, a spinner, said outlet passage having a seat for said valve disc, said spinner being cylindrical and located immediately back of the valve disc, said spinner being entirely within said outlet passage and separated from the sides of said passage by restricted clearance space, and vanes for said spinner causing rapid rotation thereof and directing all the fluid to flow through said clearance space before leaving said outlet.

2. A mixing structure for internal combustion engines comprising a fluid inlet duct terminating in a cylindrical outlet passage, a valve disc, a spinner, said outlet passage having a seat for said valve disc, said spinner being cylindrical and located immediately back of the valve disc, said spinner being entirely within said outlet passage and separated from the sides of said passage by a restricted clearance space, said spinner having slots forming vane surfaces subjected to fluid pressure whereby said spinner will be rapidly rotated, said slots extending from the outer end of said spinner and communicating with said clearance space but terminating short of the inner end of said spinner whereby all the fluid will be directed to flow through said clearance space, said clearance space communicating with said outlet when said valve is open.

In witness whereof, I hereunto subscribe my name this 21 day of July 1924.

ALFRED L. LATHROP.