C. C. THOMAS.

CARBURETER.

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1,167,320.

Patented Jan. 4, 1916.

Fig 1.

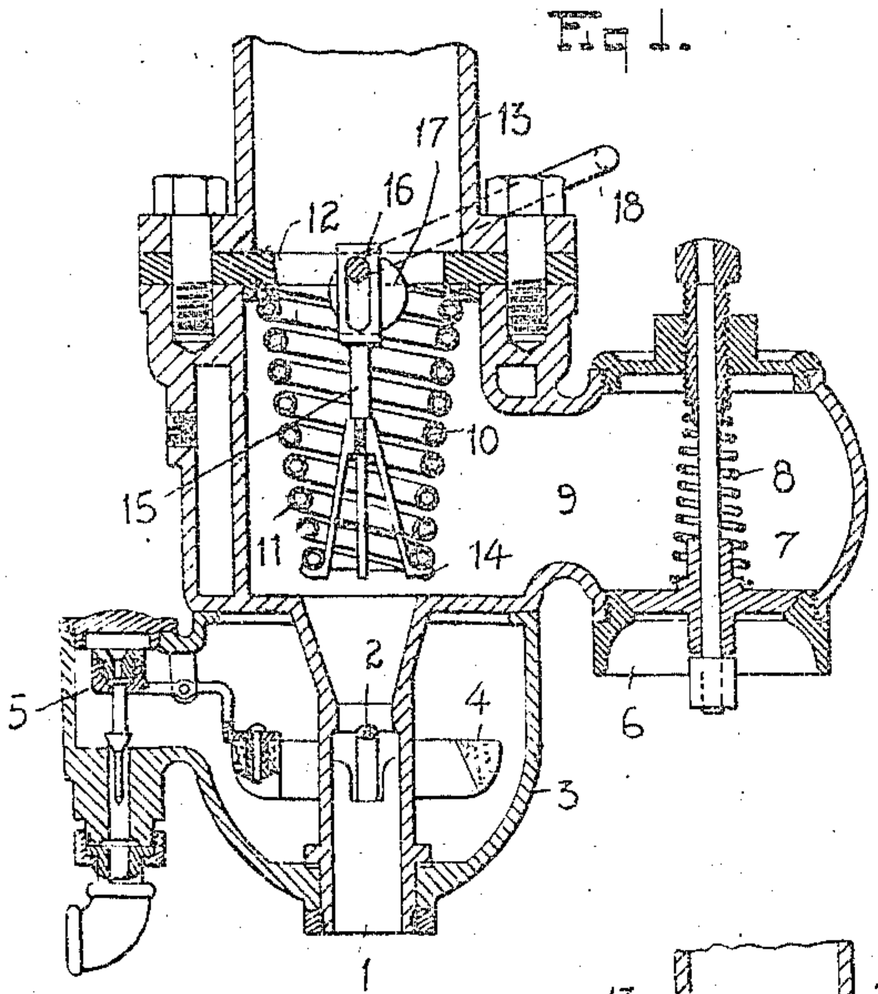


Fig 2.

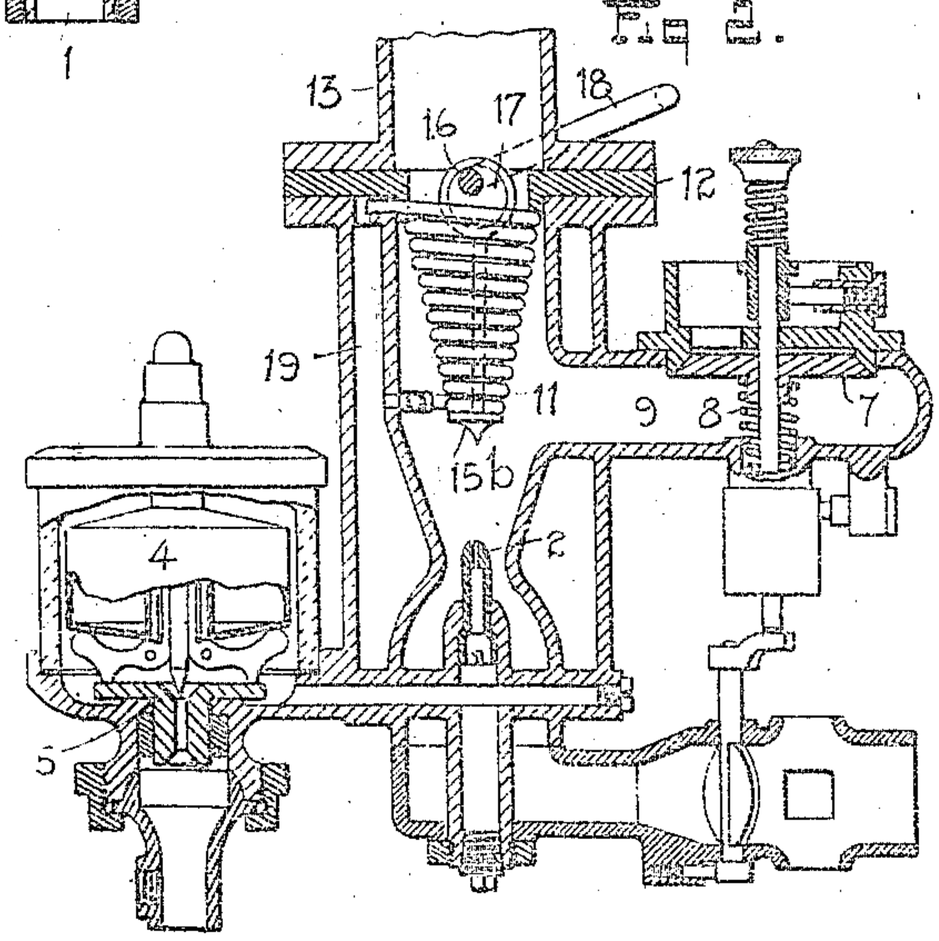


Fig 3.

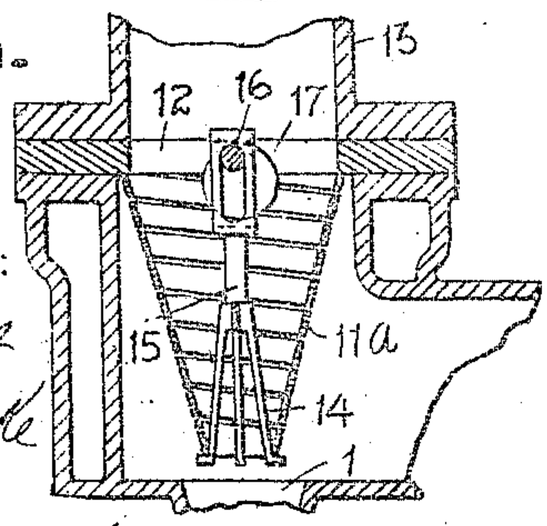
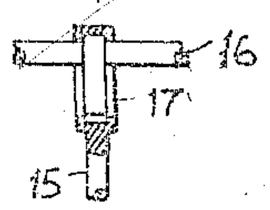


Fig. 4.



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CARBURETER.

1,167,320. Specification of Letters Patent. Patented Jan. 4, 1916.

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To all whom it may concern:

Be it known that I, CARL C. THOMAS, a citizen of the United States of America, and a resident of Baltimore, State of Maryland, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

My invention relates to improvements in carbureters, and comprises means for insuring a more thorough mixture of air and combustible than is produced by present carbureters, together with better control of the flow of the mixture and the finer atomization of the liquid.

The object of my invention is to provide a more perfect mixture of air and combustible, and a finer atomization of the combustible, to avoid stratification, to avoid deflection of the mixture toward the walls of the engine intake or manifold passage, to obtain more effective control of the flow of the mixture and, in general, to provide a more efficient carbureter giving higher fuel economy and better engine performance, and to do this by simple and relatively inexpensive means.

I will now proceed to describe my invention with reference to the accompanying drawings, and will then point out the novel features in claims.

In said drawings: Figure 1 shows a central vertical section of one form of my improved combined mixing device and valve located in a carbureter of one well known type. Fig. 2 shows a central vertical section of another well known type of carbureter having an alternative form of my improved combined mixing device and valve. Fig. 3 shows a fragmentary vertical section of the upper portion of a carbureter and lower portion of an engine intake, and shows an alternative form of my improved mixing device and valve. Fig. 4 is a fragmentary vertical section of one form of device for adjusting the combined mixing device and valve.

It is well known that carbureters of the present day do not deliver to the engine a perfect mixture of air, and gasolene or kerosene, as a gas, but that the mixture is full of drops of liquid gasolene or kerosene; one reason being that the so-called "auxiliary air" is not properly mixed with the stream of atomized liquid and air at and beyond the point where the current of auxiliary air joins the main or primary stream of air carrying misted gasolene or kerosene in suspension. Another reason is that in practice, stratification occurs, in the carbureter and in the intake pipe of the engine, to a very great extent. It is well known that gases of even slightly different specific gravities are very prone to stratification; that it is an extremely difficult matter to produce a fairly uniform mixture of two gases of somewhat different specific gravities. Now the specific gravity of gasolene vapor is much greater than that of air, and the specific gravity of air with liquid gasolene or kerosene in suspension is higher than that of gasolene vapor. Ordinarily, the auxiliary air is admitted at the side of the carbureter, and passes up into the engine intake at the side of the primary current of air with misted gasolene or kerosene in mechanical suspension, and without proper mixture with such primary current. The conditions existing in the ordinary carbureter are, therefore, particularly such as favor stratification as against thorough mixture; and this tendency to stratification is further enhanced in the ordinary carbureter, by the ordinary butterfly or throttle valve, which, commonly, is so placed as to favor passage of the auxiliary air up along one side of such throttle valve, and to favor the passage of the principal portion of the primary current air with gasolene or kerosene in suspension along the other side of such valve.

By the present invention I provide a combined mixing device and throttle valve, applicable to existing carbureters, which mixing device produces a thorough mixture of the auxiliary air with the main or primary current of mixed air and misted kerosene or gasolene, and which also tends to atomize the combustible more finely, to deflect the mixture away from the walls of the engine manifold or intake, and thereby to prevent condensation upon the manifold, and which, acting as a throttle valve, gives a more perfect control of the flow of the mixture than is obtained by ordinary throttle valves.

Referring first to Fig. 1: Numeral 1 designates the main air passage, or primary air passage, of the carbureter, 2 the spray nozzle, 3 the so-called carbureter bowl, 4 the float and 5 the float valve operated by that float. 6 designates the usual auxiliary air inlet, 7 the auxiliary air valve, and 8 the spring for that valve. 9 designates the throat through which the auxiliary air passes into the primary air passage 1. 10 desig-

nates my improved combined mixing device and throttle valve. In the form shown in Fig. 1 it consists of a light slightly conical spring 11, preferably formed of hollow or tubular wire, and seated at its upper or larger end against a washer 12 interposed between the carbureter and the engine manifold 13. Within this spring 11 there is a spider 14, the legs of which engage the lower end of the spring 11, while at the center said spider is connected to a rod 15 slotted for engagement with the crank pin 16 of an eccentric 17 pivoted to the washer 12. Outside of the carbureter a lever 18 is provided, whereby the eccentric 17 may be oscillated so raising and lowering the spider 14, and so contracting the spring 11 or permitting the spring to expand. It will be seen that with contraction or compression of the spring 11 the space between successive coils of this spring will be reduced, and that with expansion of the spring the space between successive coils of the spring will be increased, so that the spring, provided with means for contracting or compressing and expanding or elongating it, forms an efficient throttle valve. Furthermore, this throttle valve is free from the tendency to produce stratification which is characteristic of the ordinary butterfly throttle valve commonly used in carbureters. Such butterfly valves are commonly placed at about the point where the auxiliary air enters the main air passage, and tend to cause the auxiliary air to pass up on one side of the butterfly valve, and to cause the primary mixture to pass upon the other side of the butterfly valve. Such stratification if produced, tends to persist clear to the engine cylinder or cylinders, and is a frequent cause of imperfect combustion and of uneven firing in different cylinders of a multi-cylinder engine. My improved valve, placed as shown, opposite the throat through which the auxiliary air enters the main mixture passage, not only produces no tendency to stratification, but, by causing both the primary mixture and the auxiliary air to flow through the spaces between the coils of the valve into the interior of the valve, tends to cause very thorough and intimate mixture of the primary and secondary currents, together with a much finer atomization of the combustible than is obtained in ordinary carbureters. Furthermore, the tendency of the valve, arranged as shown, is to direct the mixed current up through the center of the engine intake 13, whereas the ordinary butterfly throttle valve tends to direct the mixture against the walls of the engine manifold. The manifold being, usually (particularly when starting) somewhat cold, contact of the mixture with this manifold tends to produce condensation, which is to be avoided.

As shown particularly in Fig. 4, the eccentric 17 works in a slot in the rod 15, and by pressing against the top of such slot varies the length of the spring 11 as said eccentric is oscillated.

The arrangement shown in Fig. 2 is substantially the same as that shown in Fig. 1, except that the ends of the coil spring 11 are shown connected to the water jacket space 19 of the carbureter, whereby the heated water of this jacket space may be caused to flow through the hollow tube forming the spring 11, such spring thereby serving as a very efficient device for heating the mixture of combustible and air passing through the spaces between the successive coils of the spring. I have illustrated the connection of the hollow tubing forming the spring to the water jacket space of the carbureter, merely as an illustration of one means for supplying heated fluid to such hollow tubing. I may employ any other means for passing a heating fluid through the tubing of this spring, or for heating the spring, and do not limit myself to the particular means shown.

In the arrangement shown in Fig. 3, the spring valve, instead of being formed of hollow tubing, is formed of a flat ribbon wound into a conical helix; numeral 11ª designating the said helix.

What I claim is:

1. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located at the intersection of the primary and auxiliary air passages, and comprising a hollow member having a helical slot through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said device axially, or permitting extension of said device axially, at will, and thereby varying the width of such helical slot.

2. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located, in part at least, at the intersection of the primary and auxiliary air passages, and comprising a hollow member having a helical slot through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said device axially, at will, and thereby varying the width of such helical slot.

3. The combination with a carbureter having communicating passages for primary

and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located at the intersection of the primary and auxiliary air passages, and comprising a hollow member flaring outwardly in the direction of flow, and having a helical slot through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said device axially, or permitting extension of said device axially, at will, and thereby varying the width of such helical slot.

4. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located in part at least at the intersection of the primary and auxiliary air passages, and comprising a hollow member flaring outwardly in the direction of flow, and having a helical slot through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said device axially, or permitting extension of said device axially, at will, and thereby varying the width of such helical slot.

5. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located at the intersection of the primary and auxiliary air passages, and comprising a helical spring having between successive coils openings through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said spring axially, or permitting extension of said spring axially, at will, and thereby varying the width of the spaces between the successive coils.

6. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located at the intersection of the primary and auxiliary air passages, and comprising a conical helical spring having between successive coils openings through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said spring axially, or permitting extension of said spring axially, at will, and thereby varying the width of the spaces between the successive coils.

7. The combination with a carbureter having communicating passages for primary and auxiliary air respectively, and having means for injecting fuel into the primary air, prior to the entry of the auxiliary air into the primary air passage, of a combined mixing device and valve located at the intersection of the primary and auxiliary air passages, and comprising a conical helical spring formed of tubular material having between successive coils openings through which the vapor and air currents may pass into the interior of said combined mixing device and valve, and means for compressing said spring axially, or permitting extension of said spring axially, at will, and thereby varying the width of the spaces between the successive coils, and means for circulating heated fluid through the coils of said spring.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CARL C. THOMAS.

Witnesses:
MARY M. MAGRAW,
HARRIET S. MAGRAW.