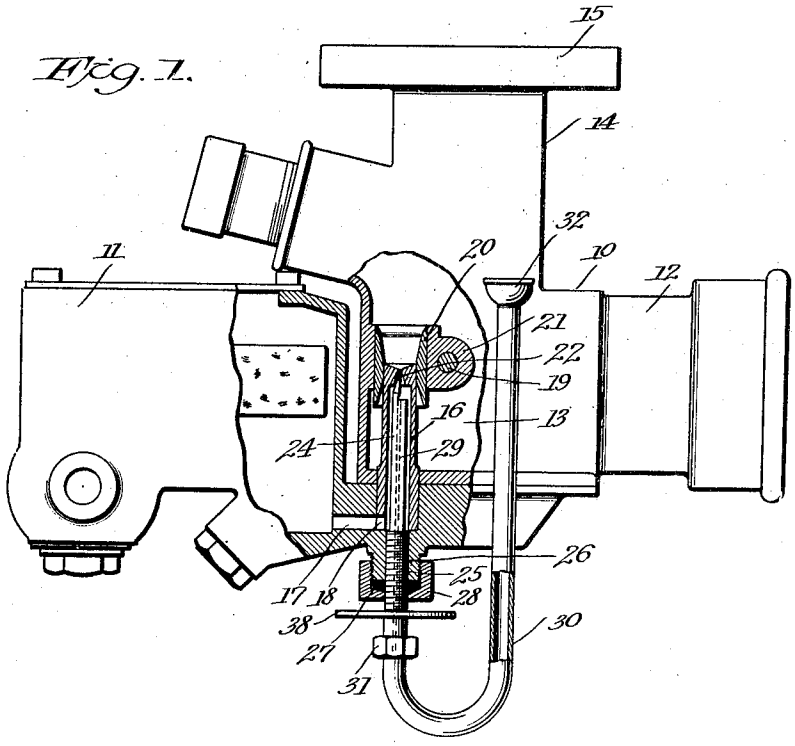
June 9, 1931. A. W. LEE ET AL 1,809,485

CARBURETOR

Filed Dec. 27, 1929 2 Sheets-Sheet 1

Fig. 1.



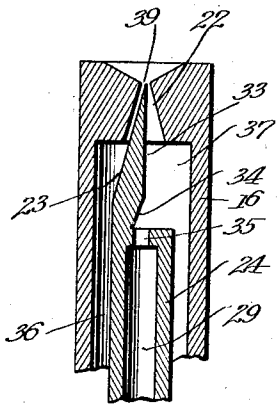


Fig. 2.

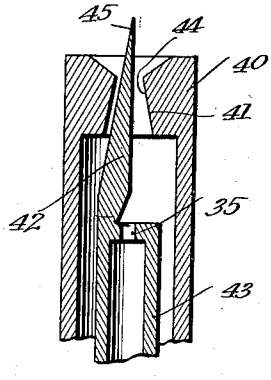


Fig. 3.

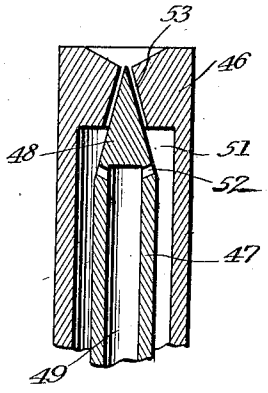


Fig. 4.

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CARBURETOR

Filed Dec. 27, 1929 2 Sheets-Sheet 2

Fig. 6.

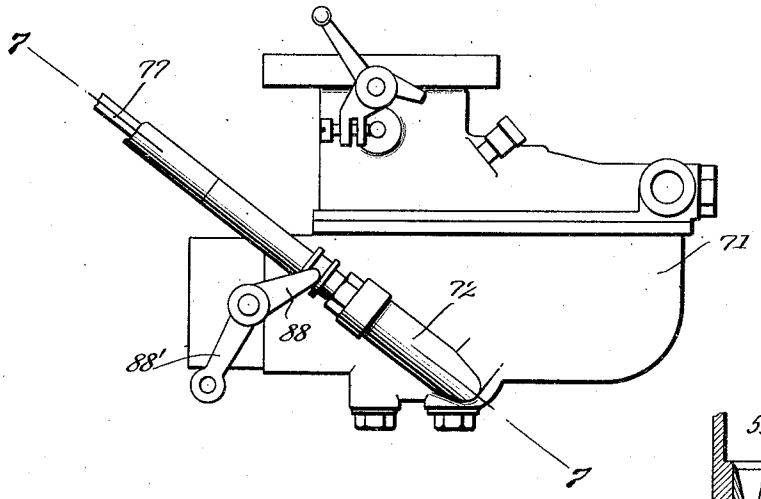


Fig. 5.

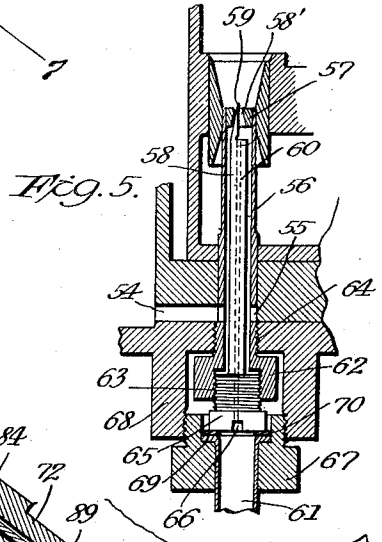


Fig. 7.

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UNITED STATES PATENT OFFICE

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CARBURETOR

Application filed December 27, 1929. Serial No. 416,965.

The present invention relates to carburetors and more especially to improved means in fuel mixing apparatus in which a needle valve is employed for controlling the flow of the combustible mixture to the engine.

One of the serious difficulties found to exist in carburetors of this type resides in the fact that at least forty per cent of the gasoline which passes through the supply passage and the needle valve is not combusted. This uncombusted gasoline cannot pass back through the needle valve for further use, but is sucked into the cylinders as raw gasoline and leaks past the pistons so as to finally lodge in the crank case. It will, therefore, be seen that not only is a large quantity of the fuel dissipated, but also the lubricating oil, due to the mixture of the raw gasoline therewith, loses its lubricating qualities which in turn has a most detrimental effect on the cylinders, pistons, rings, bearings and other parts of the engine.

In practically all types of carburetors now in use, the raw gasoline is sucked through the needle valve into the intake manifold where means are provided for admitting and regulating the air in order that the raw gasoline may be mixed with the air before being sucked into the cylinders.

A primary object of the present invention is to provide means for vaporizing the liquid fuel before it reaches the intake manifold so that practically all of the gasoline passing through the needle valve into the engine is combusted, thus eliminating the danger of the raw gasoline being carried to the cylinders and escaping to the crank case.

A further object is to provide an improved needle valve with a coned-tip having a medially disposed cut away portion that forms a flat side which coacts with an axially disposed air inlet in the needle valve for effectively vaporizing the fuel before it reaches the engine manifold.

A further object comprehends the provision of a simple, efficient, compact and economical needle valve capable of use on all types of carburetors and fuel mixing devices in which the liquid fuel and air are mixed adjacent the valve seat and at a point opposite the intake manifold so that the fuel will be vaporized prior to its introduction into the engine.

Another object consists in providing a needle valve with an air hole which communicates with the fuel supply passage at a point beneath the tip of the valve and which may be readily interchanged with or substituted for other types of needle valves without involving a material change in the construction or arrangement of the carburetor.

Other objects of the invention will become apparent from the following description taken in conjunction with the accompanying claims and drawings.

Referring to the drawings in which are shown several preferred embodiments of the invention:

Figure 1 is a side elevation of a carburetor with the invention applied thereto showing parts in section.

Figure 2 is a detailed enlarged sectional view of the needle valve.

Figure 3 is a view substantially similar to Figure 2 of a modified form of needle valve.

Figure 4 is a detailed sectional view of a further modification.

Figure 5 is an enlarged detail sectional view of a modified form of the invention.

Figure 6 is a side elevation of a carburetor with the invention applied thereto.

Figure 7 is an enlarged sectional view taken substantially along the line 7—7 of Figure 6.

Referring to the drawings in which like numerals indicate like parts in the various views, 10 denotes a carburetor of the float feed type having a float chamber 11, an air inlet 12, and a mixing chamber 13 in vertical alignment with the tubular portion 14 that

has an annular flange 15 for connecting the carburetor to the intake manifold of the engine.

Positioned within the mixing chamber 13 is a tubular member 16 which communicates with the port 17 leading from the bottom of the float chamber 11 through a lateral opening 18 and may have its upper end maintained in proper position by a sleeve 20 which is detachably mounted within the chamber 13 by the bracket 21 carried by the transverse pin 19.

The upper end of the tubular member 16 is preferably formed with a tapered valve seat 22 (Figure 2) arranged to receive the coned-tip 23 of the needle valve 24 which valve extends through the bottom of the carburetor 10 and is axially disposed within the tubular member 16. The lower portion of the valve is preferably externally threaded as at 25 and extends through an externally threaded boss 26 formed in the bottom of the carburetor. In order to insure a tight joint being formed between the parts, a packing 27 is positioned between the end of the boss 26 and a retaining nut 28. The needle valve 24 has an axial through opening 29 which communicates with and is connected to an air tube 30 as at 31. The tube 30 is bent upwardly so as to have its upper end 32 in substantially horizontal alignment with the top of float chamber 11 to prevent overflow of the fuel when the motor is stopped. The end 32 may also be provided with an air filter to allow clean outside atmospheric air to pass through the needle valve 24.

In order that the liquid fuel or gasoline from the float chamber 11 may be vaporized prior to its introduction into the intake manifold of the engine, the coned-tip 23 of the needle valve 24 is cut away through substantially half of its diameter to form the flat vertically disposed face 33 which terminates at its lower end in an inclined side or notch 34, so that the air as it issues through a restricted port 35 from the axial passage 29 of the needle valve, strikes the side 34 and is deflected upwardly and laterally therefrom. The liquid fuel is carried from the passage 17 through the port 18 and upwardly through the annular passage 36 formed between the tubular member 16 and the needle valve 24 (Figure 2) and mixes in the chamber 37 with the air at a point directly beneath the valve seat 22 or on the side opposite the intake manifold of the carburetor.

The needle valve 24 is adjustable relative to the valve seat 22 through the instrumentality of the disc or handle 38 that is fixedly secured to the exposed threaded portion 25 of the needle valve so that upon being manually actuated it will move the coned-tip 23 into or out of engagement with the valve seat 22 as may be desired.

It will be seen that when the coned-tip 23 is moved away from the valve seat 22 to permit the mixture of gasoline and air to pass into the intake manifold, that by virtue of the flat face 33, a larger passage is formed on one side of the coned-tip 23 than on the other side, thus allowing more of the combustible mixture to be delivered to the engine from the first mentioned side. Moreover, as the suction action of the motor is greatest on the flat side 33 of the coned-tip it will cause the gasoline to be sprayed and mixed with the air in the form of vapor instead of in liquid form. In other words, practically all of the raw gasoline will be vaporized before it enters the intake manifold so as to be easily combusted when it reaches the engine.

In operation, the coned-tip 23 of the needle valve 24 is first adjusted relative to the valve seat 22 to obtain the desired mixture of air and gasoline through the opening 39 which communicates with the mixing chamber 13. In this connection it might be mentioned that it is necessary to make but one adjustment of the needle valve for all year temperatures, hill climbing, traffic driving, city and long distance driving. When the motor is stopped, the fuel from the chamber 11 passes upwardly through the passage 36 and fills the tube 30, but will be prevented from overflowing or dripping therefrom due to the fact that the top of the tube is substantially level with the chamber 11. When the motor is started, the air and fuel are intimately mixed and vaporized beneath the valve seat 22 and as the flat side 33 of the coned-tip permits a greater area to be sprayed at the suction point 37 and mixed with the jet of air issuing from the opening 35 in the form of vapor, it prevents the combustible fuel being conducted to the engine in liquid form and the danger of the raw gas escaping to the crank case. Moreover, when the motor is started, the raw fuel contained in tube 30 is immediately drawn into the carburetor by the suction of the motor as it sucks air, and is vaporized with the fuel from the carburetor bowl. In other words, the tube 30 is filled with fuel only when the motor is stopped and is entirely free from fuel when the motor is running.

It will be seen that the inclined face 34 of the coned-tip 23 causes the air to be deflected outwardly and upwardly into the chamber 37 so as to more effectively spray the gas and insure vaporization of the mixture before the same passes through the opening 39 of the valve seat.

In the modified form of the invention illustrated in Figure 3, the parts are substantially the same as those previously described with the exception that the tubular member 40 is provided with a valve seat 41 of larger diameter than the valve seat 22 while the coned-tip 42 of the needle valve 43 is of sufficient length to extend through the opening 44 of the valve seat and slightly beyond the end

of the tubular member 40. Due to the fact that the tip 45 of the cone is arranged to protrude through the valve seat, the spraying effect of the liquid fuel and air which are mixed at a point below the valve seat 41 is materially increased and allowed to continue until the combustible mixture is delivered to the intake manifold. It has been found that by reason of the lengthened needle point and the enlargement of the opening 44 of the valve seat, that when the device is installed on a motor vehicle, that the machine can be throttled down to a very slow speed without any apparent strain on the motor, or backfiring of the engine.

In the modification exhibited in Figure 4, the tubular member 46 is substantially the same in construction as the forms above described, while the needle valve 47 differs from the needle valves previously set forth in that the cone tip 48 thereof is not provided with a cut away portion and the axially disposed air passage 49 is arranged to communicate with the suction point or chamber 51 through the radially inclined ports 52 so that the gas and air may be mixed below the valve seat 53 and the combustible mixture introduced into the intake manifold in a vaporized state.

Figure 5 shows a modification somewhat similar to the form illustrated in Figure 1, but essentially differs therefrom in that the needle valve is arranged to be fixed or set in position. In this figure, the gasoline from the float chamber is conducted through the passage 54 and the diametrically opposed ports 55 in the sleeve 56 to a point adjacent the valve seat 57 in substantially the same manner as shown in Figure 1. The needle valve 58 has a coned-tip 59 which protrudes through the valve seat passage 58′ and also is provided with an axial air opening 60 which communicates with a bent air inlet pipe 61 which may be similar in construction to the pipe 30 previously described.

The lower portion of the sleeve 56 preferably terminates in an enlarged internally threaded head 62 which receives the complementary threaded portion 63 of the needle valve 58 and is also provided with a reduced externally threaded portion 64 which engages a complementary threaded portion of the carburetor so as to maintain the sleeve in fixed operative position. In order to facilitate the insertion and removal of the needle valve, the lower end thereof is formed with an enlarged smooth head 65 having a kerf 66 for receiving a suitable tool such as a screw driver or the like. A clamping nut 67 is threaded to a depending skirt portion 68 of the carburetor and coacts with the head 65 and washer 69 for clamping the flange 70 of the pipe 61 in position. In this form of the invention the needle valve 58 when once properly adjusted is allowed to remain in fixed position until conditions make it necessary to make further adjustments.

In Figures 6 and 7, the needle valve is shown applied to a carburetor used with a well known make of car. In these figures, 71 designates the carburetor which is provided with a tubular portion 72 that communicates through the port 73 with the float chamber 74 and has mounted therein a removable valve seat plug 75. In order that the gasoline as it issues from the passage 73 and is conducted through the opening 76 of the plug 75, may be sprayed or vaporized before it reaches the intake manifold, there is provided a carburetor adjusting rod 77 which is operated from the dash of the vehicle and preferably is formed in two sections that are connected together as at 78 (Figure 7). The lower section 79 has an axial opening 80 which communicates with the atmosphere through a lateral port 81. The lower end of the section 79 is formed with a coned-tip 82 arranged to extend into the valve seat and is substantially similar in operation to the needle valve described in Figures 1 and 2.

The lower section of the adjusting rod 77 is supported in position by a sleeve 83 which has an enlarged externally threaded portion 84 that engages the tubular portion 72 of the carburetor and an internally threaded portion 85 for securing the section 79 thereto. A slidable member 86 surrounds the section 79 and sleeve 83 and has the spaced annular flanges 87 for receiving the finger 88 of the carburetor air shutter lever 88′.

In operation the rod 77 is adjusted from the dash so that the needle valve will allow the desired flow of gasoline from the chamber 74 to pass through the port 73 and passage 76 and be entrained with the air from the passage 80 in the chamber 89, so that the gasoline will be vaporized before it reaches the manifold.

It will be observed that in all of the forms disclosed, that means are provided for vaporizing the raw gas before it enters the intake manifold so that the maximum amount of gasoline is combusted in contra-distinction to those types of carburetors in which the vaporization takes place in the manifold after the raw gasoline is admitted. In other words, by reason of the present development, practically all of the raw gasoline is vaporized so that a very small quantity remains uncombusted or is dissipated.

Moreover, due to the vaporizing of the gasoline prior to its introduction into the engine manifold, a substantial saving in fuel as well as a material increase in mileage and power is effected and the injurious effects resulting from mixture of the raw gasoline with the oil in the crank case is practically obviated.

The forms of the invention herewith shown and described are merely illustrative

of preferred embodiments and it is to be understood that such changes may be made therein as fall within the purview of one skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. In combination with the mixing chamber of a carburetor, a valve seat mounted in said chamber and having a supply opening therethrough, means for supplying gasoline through said opening to the engine, a needle valve having an axially disposed air hole and a coned-tip arranged to extend into said valve seat for controlling the flow of the fuel supply, said tip having a flat face in alignment with said hole whereby the fuel is vaporized before being introduced into the engine manifold.

2. In combination with the mixing chamber of a carburetor, a valve seat mounted in said chamber and having a supply opening therethrough, means for supplying gasoline through said opening to the engine, a needle valve having an axially disposed air hole and a coned-tip arranged to extend into said valve seat for controlling the flow of the fuel supply, said tip having an axially disposed tapered face terminating in an inclined portion adjacent said hole whereby the fuel is vaporized prior to its introduction into the engine manifold.

3. In combination with the mixing chamber of a carburetor, a valve seat mounted in said chamber and having a supply opening therethrough, means for supplying fuel through said opening to the engine, a needle valve having an axially disposed air hole and a tapered tip portion arranged to extend into said valve seat for controlling the flow of the fuel supply, said tip portion having a smooth flat face terminating in an inclined notch adjacent said hole whereby the fuel is vaporized before entering the engine manifold.

4. In combination with the fuel supply passage of a carburetor, a tubular member mounted in said passage, said member having a valve seat, a needle valve adjustably mounted in said tubular member, said needle valve having an axially offset coned-tip arranged to engage said valve seat and an axially disposed air hole communicating with said member at a point beneath said coned-tip.

5. In combination with the fuel supply passage of a carburetor, a tubular member mounted in said passage, said member having a valve seat, a needle valve adjustably mounted in said tubular member, said needle valve terminating at one end in a coned-tip cut away through substantially half of its diameter and arranged to engage said valve seat, said needle valve having an axially disposed air hole communicating with said member at the base of the coned-tip whereby the fuel is vaporized at a point beneath the coned-tip.

6. In a carburetor of the class described having a fuel passage communicating with the intake manifold of an engine, a tubular member mounted in said passage and terminating at one end in a tapered valve seat and communicating adjacent its other end with a fuel supply passage, a needle valve adjustably mounted in said tubular member and communicating with the fuel supply, said needle valve terminating at its upper end in a coned-tip cut away through substantially half of its diameter and arranged to engage said valve seat for controlling the flow of the combustible mixture to the manifold, said needle valve having an axially disposed air hole communicating with said member at the base of the coned-tip, whereby the fuel is vaporized at a point adjacent the valve seat.

7. A needle valve for controlling the supply of the combustible mixture to an engine or the like comprising a tubular member having a valve seat communicating with the fuel supply, and a needle valve axially mounted in said tubular member and having a coned-tip cut away through substantially half of its diameter and arranged to engage said valve seat for controlling the flow of the fuel supply therethrough, said needle valve having an axial air opening communicating with the tubular member at a point beneath said valve seat.

8. A needle valve of the class described comprising a coned-tip having a vertically disposed cut away portion and an axial air opening.

9. A needle valve of the class described having a coned-tip cut away through substantially half of its diameter to provide a vertically disposed flat tapered face and an axially disposed air hole in substantially vertical alignment with said face, said face terminating adjacent said opening in an inclined portion.

10. A needle valve of the class described comprising a coned-tip cut away through substantially half of its diameter to provide a flat tapered face and an air passage formed in said needle valve and communicating with said coned-tip at the base thereof.

11. In combination with the mixing chamber of a carburetor, a valve seat mounted in said chamber and having a supply opening therethrough, means for supplying fuel through said opening to the engine, a needle valve having an axially disposed air hole and a cone tip having a flat face arranged to extend into said valve seat for controlling the flow of the fuel supply, and means for mixing the air and fuel at a point adjacent the base of the cone tip.

12. In combination with the mixing chamber of a carburetor, a valve seat mounted in

said chamber and having a supply opening therethrough, means for supplying fuel through said opening to the engine, a needle valve having an axially disposed air hole and a cone tip having a flat face arranged to extend into said valve seat for controlling the flow of the fuel supply, means for mixing the air and fuel at a point beneath the cone tip, and an air pipe connected to the lower end of said needle valve and having an upwardly extending portion communicating with the atmosphere.

In testimony whereof we have hereunto set our hands.

ALBERT W. LEE.
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