Oct. 19, 1937. P. K. REITMEYER 2,096,407

CARBURETOR

Original Filed Feb. 21, 1934

Fig. 1.

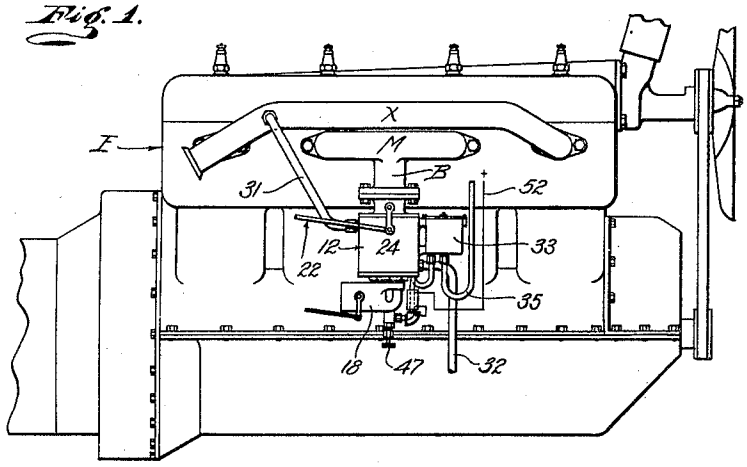


Fig. 2.

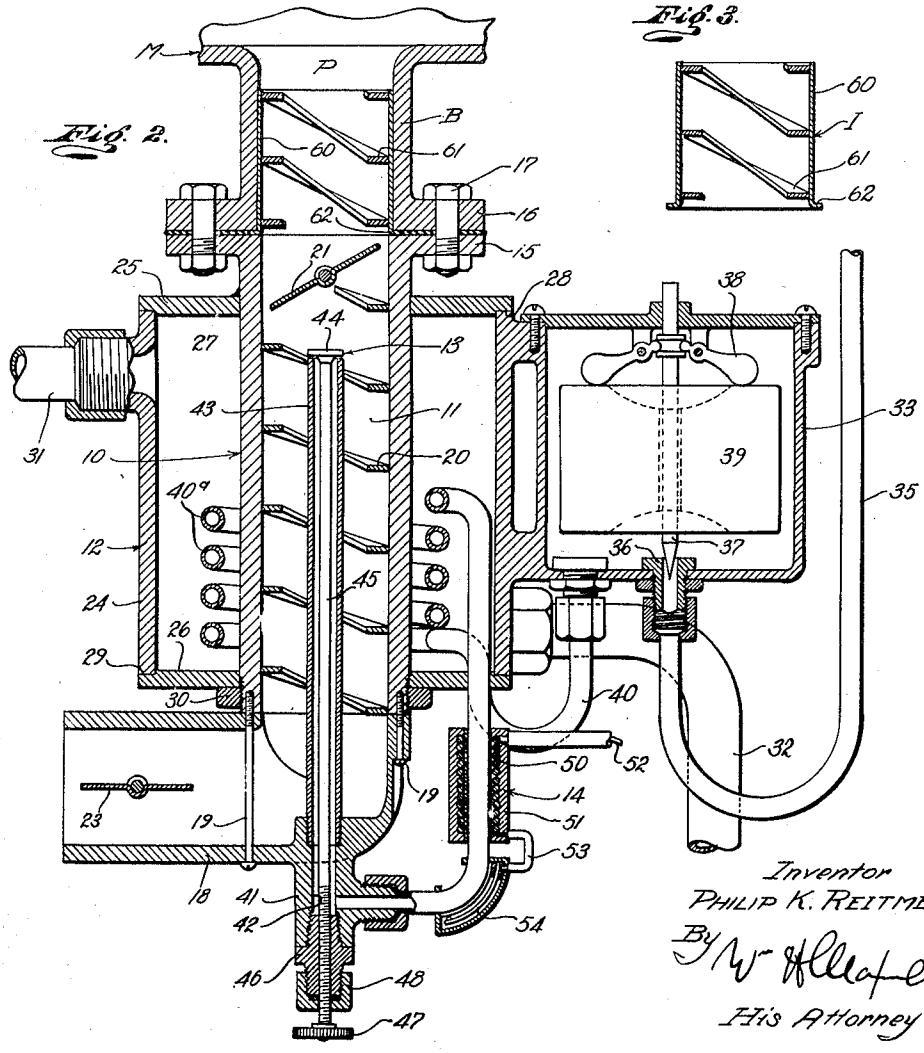


Fig. 3.

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CARBURETOR

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5 Claims. (Cl. 261—12)

This invention relates to carburetors for producing explosive mixtures for operating internal combustion engines. A general object of the invention is to provide a simple, practical carburetor that is capable of effectively breaking up and vaporizing a volatile liquid fuel to produce an explosive mixture for the successful efficient operation of the engine with which it is connected.

Another object of the invention is to provide a carburetor in which the incoming air is made to spirally revolve in a column and in which the liquid fuel is sprayed into this column at an acute angle thereto to be thoroughly vaporized and broken up through a centrifugal action.

Another object of the invention is to provide a carburetor that heats the air and the liquid fuel to desirable predetermined temperatures prior to their admixture whereby the carburetor is capable of producing explosive mixtures from comparatively heavy or low grade fuels for the proper efficient operation of the engine.

Another object of the invention is to provide a carburetor of the character mentioned that includes an adjustable jet or sprayer for discharging the liquid fuel outwardly within the spirally rotating column of air to effect a complete distribution and carburetion of the liquid fuel.

Another object of the invention is to provide a carburetor of the character mentioned having a mixing chamber provided on its wall with a helical or spiralled flange for causing the air passing through the chamber to rotate and thus bring about a cyclonic induction of the liquid fuel sprayed into the rotating column.

Another object of the invention is to provide a carburetor that is readily adapted for use on various makes and types of internal combustion engines and that embodies a heating manifold and a fuel reservoir assembly that may be easily and quickly set in any rotative position as may be required.

Another object of the invention is to provide a carburetor of the character mentioned that includes an automatic means for preheating the liquid fuel to maintain the fuel at a desirable predetermined temperature under all conditions of operation of the engine.

A further object of the invention is to provide an insert for the manifold of the engine with which the carburetor of the invention is employed for continuing the rotation of the air initiated in the carburetor and to complete the atomization of the fuel and to insure a more perfect distribution of the explosive mixture to the cylinders of the engine.

Other objects and features of the invention will be better and more fully understood from the following detailed description of a typical form and application of the invention, throughout which description reference may be had to the accompanying drawing, in which:

Fig. 1 is a side elevation of the carburetor of the invention illustrating it in connection with a typical internal combustion engine of the class employed in vehicles. Fig. 2 is an enlarged vertical detailed sectional view of the carburetor and Fig. 3 is a longitudinal detailed sectional view of the attachment or insert apart from the manifold.

The carburetor provided by this invention includes, generally, a tubular body 10 adapted to be connected with the intake manifold M of an internal combustion engine E and providing an elongate mixing chamber 11, a heating manifold 12 around the body 10, means 13 for jetting or spraying liquid fuel into the mixing chamber 11 and means 14 for preheating the liquid fuel supplied to the spraying means 13.

The body 10 is an elongate tubular member or structure whose longitudinal opening forms the air inlet passage and mixing chamber 11. The body 10 is preferably of considerable length and is intended to be connected with the intake manifold M of the engine. In the particular construction illustrated in the drawing a flange 15 is provided on the upper end of the body 10 and is connected with the flange 16 of the manifold M by spaced bolts 17. The body 10 is connected with the manifold M so that the chamber 11 is in direct longitudinal alignment with the passage P in the receiving arm or branch B of the manifold M. A fitting or elbow 18 is provided on the lower end of the body 10. The elbow 18 is adjustably and removably connected with the body 10 by spaced screws 19 in a manner so that it may be set or positioned to have its laterally projecting mouth extending in any desired or required direction.

An important feature of the invention is the provision of means in the body 10 for causing the incoming air to rotate in a spiral manner as it passes through the body into the manifold M. The means for causing rotation or spiralling of the air comprises a helical or spiralled flange 20 on the wall of the mixing chamber 11. The spiralled flange 20 is preferably comparatively long and may extend from the lower end of the chamber 11 to a point adjacent the upper end

of the body 10. The rotation producing flange 20 may be cast or formed integrally with the body 10 or may be a spiralled spring-like member inserted in the chamber 11 and suitably attached to the body. The flange 20 is of uniform pitch throughout its length and its convolutions are of substantial width. The air flowing or passing upwardly through the chamber 11 impinges against the spiralled flange 20 and is thus given a spiralled rotary motion. The central portion of the inflowing column of air is induced to rotate by the cyclonic action of the outer stratum of air at the flange 20. When the air reaches the upper portion of the mixing chamber 11 it is rotating at a substantial velocity and while rotating in this manner is drawn through the passage P into the manifold M.

Valve means is provided in connection with the carburetor for governing the flow through the mixing chamber 11 to regulate the operation of the engine E. A throttle valve 21 is provided in the upper end portion of the mixing chamber 11. The throttle valve 21 may be in the nature of a butterfly valve and may be operated or regulated by a suitable operating means 22. The throttle valve 21 is positioned where it does not interfere with the flange 20 and where it does not extend or project into the manifold passage P. A choke in the form of a butterfly valve 23 may be provided in the mouth or passage of the elbow 18.

The heating manifold 12 surrounds the body 10 and utilizes the heated gases of combustion of the engine E to heat the air and mixture in the chamber 11. The manifold 12 includes a tubular shell 24 surrounding the body 10 and plates 25 and 26 closing the upper and lower ends of the shell 24, respectively. The shell 24 is considerably larger in diameter than the body 10 to provide a comparatively large heating chamber 27. The plate 25 has an opening passing the body 10 and is attached to the body at a point below the flange 15. An annular peripheral recess 28 is provided in the under side of the plate 25 to receive the upper end portion of the shell 24. The lower plate 26 surrounds the body 10 adjacent its lower end and has a peripheral recess 29 in its upper side receiving the lower end of the shell 24. A nut 30 is threaded on the body 10 to engage the plate 26 to clamp together the manifold assembly and to hold it against movement.

It is a feature of the invention that the shell 24 and parts associated therewith may be turned to any desired rotative position to adapt the carburetor for installation on various types of engines without disturbing or modifying the body 10. When the nut 30 is loosened the shell 24 and plate 26 may be turned together or independently to any rotative positions. A pipe 31 extends from the exhaust manifold of the negine E to the upper portion of the shell 24 where it communicates with the chamber 27. An exhaust or discharge pipe 32 communicates with the lower portion of the chamber 27 and extends to any suitable point. The gases of combustion from the engine E are passed through the pipe 31 to circulate through the chamber 27 and then discharge through the pipe 32. The heat of these gases warms or heats the air and explosive mixture in the mixing chamber 11 and maintains the body 10 and its flange 20 at a suitable temperature. The flange 20 in addition to causing rotation of the air operates as a heat radiating element or fin on the wall of the mixing chamber 11.

The carburetor includes a liquid fuel reservoir 33. The reservoir 33 is preferably connected or associated with the heating manifold 12. In the particular construction illustrated in the drawing the reservoir 33 is integrally joined with the shell 24. A fuel supply line 35 communicates with the lower end of the reservoir chamber. A valve seat 36 is provided at the discharge of the line 35 and a needle valve 37 is adapted to cooperate with the seat 36 to control the flow of fuel into the reservoir. The stem of the valve 37 is engaged by two weighted levers 38 which normally tend to move the valve to its open position out of cooperation with the seat 36. A float 39 is provided in the reservoir 33 to engage the levers 38 and move the valve 37 to its closed position as the level of the fuel in the reservoir rises.

A line or pipe 40 delivers the liquid fuel from the reservoir 33 to the jetting or spraying means 13. It is a feature of the invention that the pipe 40 extends from the reservoir 33 into the heating chamber 27 so that the liquid fuel is warmed or heated as it is conducted to the spraying means 13. In the form of the invention illustrated in the drawing the pipe 40 passes through an opening in the plate 26 and has a coil 40^a in the heating chamber 27 of the manifold 12. The heating coil 40^a may surround the body 10 in the lower portion of the chamber 27. The pipe 40 passes out of the chamber 27 from the coil 40^a and is connected with a boss 41 projecting from the elbow 18. The boss 41 has a fluid passage 42 which receives the liquid fuel from the pipe 40.

The means 13 for jetting or spraying the liquid fuel into the mixing chamber 11 includes a tube 43 projecting upwardly from the passage 42 to extend through the chamber 11. The tube 43 extends centrally and longitudinally through the chamber 11 to a point suitably spaced below the throttle valve 21. A spray head or nozzle head 44 is provided to control the discharge of fuel from the upper end of the tube 43. The nozzle head 44 is carried by a stem 45 which extends longitudinally through the tube 43 and the boss 41. The head 44 overlies the upper end of the tube 43 presenting a flat lower face which is normally spaced from and in opposition to the flat upper end of the tube. The base of the head 44 where it joins the stem 45 may be conical or flared upwardly and outwardly. It will be apparent how the head 44 causes the liquid fuel to be sprayed radially outwardly in all directions into the chamber 11. The evenly distributed fuel sprayed from the upper end of the tube 43 enters the revolving column of air in the mixing chamber 11 and is thoroughly mixed therewith. The air in the upper portion of the chamber 11 revolves at a substantial velocity and the liquid fuel is effectively vaporized and broken up by a centrifugal action.

Means is provided for regulating or adjusting the nozzle head 44. The stem 45 is threaded longitudinally through a plug 46 on the lower end of the boss 41. An adjusting knob or handle 47 is provided on the projecting end of the stem 45 to facilitate the turning of the stem. A suitable packing gland 48 may be provided to seal about the stem 45. The stem 45 may be turned or adjusted to regulate the discharge from the upper end of the tube 43.

The means 14 operates to heat the liquid fuel flowing through the pipe 40 when it falls below a predetermined temperature and thus automatically provides for the supplying of the liquid fuel

to the spraying means 13 at a pretermined temperature, regardless of the engine operation or the engine temperatures. The means 14 is in the nature of a thermally controlled electric heating means. The means 14 includes a heating coil 50 surrounding the portion of the pipe 40 which passes from the manifold 12 to the boss 41. The coil 50 is preferably enclosed in a suitable housing 51. One lead 52 from the coil 50 extends to a suitable control switch or to the ignition switch of the engine with which the carburetor is employed, so that the heating coil 50 is conditioned for energization upon conditioning or turning on of the ignition system. The other lead 53 of the coil 50 is grounded through a thermostat or thermostatic switch. The thermostat is arranged on the pipe 40 so that its temperature responsive contact arm or arms 54 are subjected to the temperature of the fuel flowing through the pipe. When the fuel temperature drops below a certain point the contacts 54 engage one another to complete the circuit to the ground through the coil 50. The coil 50 thus operates to warm or heat the fuel flowing through the pipe 40 in the event that the temperature of the fuel becomes too low.

The invention includes an attachment or insert I for continuing the rotation of the explosive air and fuel mixture, initiated by the flange 20, to cause a more complete carburetion and to provide for a more perfect distribution of the explosive mixture to the two oppositely extending arms or branches of the manifold M. The insert I is adapted to be arranged or positioned in the passage P of the manifold at or adjacent the point of connection of the carburetor body 10 with the manifold. The insert I includes a tubular body 60 and a spiralled flange 61 in the body.

The tubular body 60 of the insert I is adapted to be inserted or positioned in the passage P and is preferably proportioned to closely lie against the walls of the passage. Means is provided for holding or retaining the body 60 in place. A radially projecting lip 62 is provided on the lower end of the body 60 to be clamped between the flanges 15 and 16 in the manner clearly illustrated in Fig. 2 of the drawing. The length of the body 60 may depend upon the length of the branch B of the manifold M and the body preferably terminates adjacent the upper end of the branch B.

The helical or spiralled flange 61 is provided on the inner wall of the tubular body 60 and preferably extends throughout the length of the body. The flange 61 is pitched in the same direction as the spiralled flange 20 and may be in the form of a double flange similar to a "double thread". The mixture of air and fuel after passing the throttle valve 21 contacts or impinges against the flange 61 which causes it to rotate or to continue to rotate. This rotating explosive mixture is evenly or equally distributed to the two oppositely extending arms of the manifold M because of its rotary motion. It will be seen that the flange 61 continues the rotary motion of the incoming column of air and fuel initiated by the spiral flange 20 in the carburetor body 10.

It is believed that the operation of the carburetor provided by this invention will be readily apparent from the foregoing detailed description. During operation of the engine the liquid fuel is supplied to the tube 43 by the pipe 40 extending from the reservoir 33. After the engine E has been in operation the gases of combustion circulated through the chamber 27 from the pipe 31 effectively heat the fuel flowing through the pipe 40 and heat the body 10 and its flange 20. The warmed or heated fuel sprayed from the upper end of the tube 43 under the nozzle head 44 enters the incoming air being drawn into the manifold M. As described above, the helical flange 20 causes the air passing upwardly through the chamber 11 to spiral or rotate and this rotary motion of the air brings about a complete atomization of the sprayed liquid fuel. As the body 10 is surrounded by the heating manifold 12 its walls and the flange 20 are at a comparatively high temperature so that the liquid fuel that may come into contact with the body or flange is immediately volatilized. The liquid fuel sprayed from the upper end of the tube 43 is thus thoroughly mixed with the rotating column of air passing through the chamber 11. The flange 61 of the insert I causes the mixture to continue to rotate as it enters the upper portion of the manifold M. The flow through the carburetor may be checked by means of the choke valve 23 and may be suitably regulated or throttled by the throttle valve 21. In the event that the fuel passing through the pipe 40 is at a low temperature the thermostat 54 completes the electric circuit through the coil 50 whereby the coil operates to warm the liquid fuel. The means 14, if connected with the ignition switch of the engine E, automatically becomes operative when the engine E is started when in a cool or cold state. The carburetor may be readily adjusted by turning the handle 47 on the stem 45 and is adapted for installation on various types and makes of engines. As described above, the manifold 12 and the parts associated therewith may be turned to any required rotative position on the body 10 after loosening the nut 30. If desired or found necessary the screws 19 may be removed to permit the turning of the elbow 18 with or independently of the manifold 12. The carburetor of the present invention is effective in operation and simple of manufacture.

Having described only a typical form and application of my invention, I do not wish to be limited or restricted to the specific form and application herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A carburetor including a body having an elongate chamber with one end open to receive air and the other end to communicate with the intake manifold of an engine to conduct a column of air to the manifold, means acting on the peripheral portion of the column of air to cause the air to rotate spirally as it passes longitudinally through the chamber, there being a clear unobstructed central longitudinal zone in the chamber, a liquid fuel conduit extending into said zone of the chamber, and a spray head for causing fuel discharging from the conduit to be sprayed into the rotating column of air at an acute angle to its direction of movement.

2. A carburetor including a body having an elongate air conducting chamber with one end open to receive air and the other end to communicate with the intake manifold of an engine, a helical flange in the chamber for acting on the peripheral portion of the column of air passing through the chamber to cause the air to rotate spirally as it passes longitudinally through the chamber, the flange being proportioned to leave a direct clear longitudinal zone in the chamber, a heating manifold around the body, and a liquid

fuel nozzle discharging in said zone of the chamber.

3. A carburetor including a body having an elongate fluid conducting chamber with one end to receive air and the other end to communicate with the intake manifold of an engine, a helical flange on the wall of the chamber operating on the peripheral portion of the column of fluid passing through the chamber to cause the fluid to rotate spirally as it passes longitudinally through the chamber, the flange being proportioned to leave a direct unobstructed central zone in the chamber, and a centrally disposed nozzle in the chamber discharging liquid fuel radially outwardly into the rotating column of fluid.

4. A carburetor including a body having a longitudinal mixing chamber for communicating with the intake manifold of an engine, a heating manifold around the body, means for circulating the heated gases of combustion of the engine through the heating manifold, a nozzle for discharging in the mixing chamber, a fuel supply pipe having a coil portion in the heating manifold and communicating with the nozzle, and a thermostatically controlled electrical means for heating the fuel flowing through the pipe.

5. A carburetor including a body having an elongate chamber for passing a column of fluid, an elongate fuel tube arranged longitudinally in the chamber, a spray head at the outer end of the tube, means for supplying fuel to the tube, means surrounding the fuel tube and spaced therefrom to cause rotation of the column of fluid, a heating manifold around the body for heating the column as it passes through the chamber, and means for circulating heated gases of combustion of the engine through the manifold.

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