

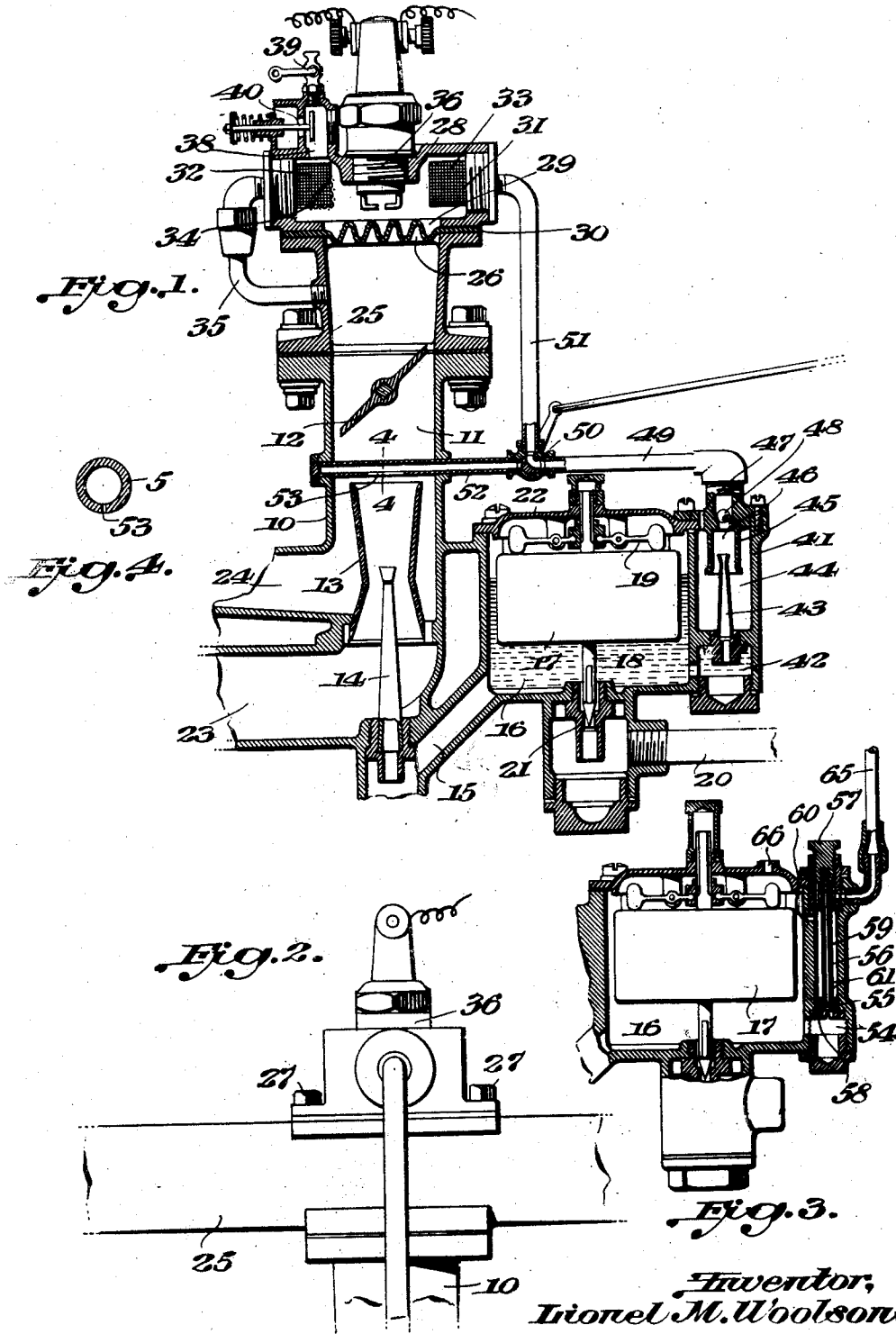
Oct. 16, 1928.

1,687,918

L. M. WOOLSON

HYDROCARBON MOTOR

Filed Oct. 18, 1919



UNITED STATES PATENT OFFICE.

LIONEL M. WOOLSON, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

Application filed October 18, 1919. Serial No. 331,691.

This invention relates to hydrocarbon motors and particularly to carburetors and mixture making and heating means.

One of the objects of the present invention is to provide an efficient means for heating the mixture passing from the motor carburetor to the motor cylinders.

Another object of the invention is to supply a properly proportioned mixture of gasoline, or other fuel, and air to a combustion heater device to insure proper burning of said mixture and the consequent heating of the mixture passing from the main carburetor to the motor.

Another object of the invention is to provide means for withdrawing mixture from the main carburetor of the motor for a combustion heater device adapted to heat the mixture passing from the main carburetor to the motor cylinders.

Another object of the invention is to provide a check valve between the carburetor supplying the combustion heater and the combustion heater chamber, to prevent backfire into the carburetor.

Another object of the invention is to provide a novel form of auxiliary carburetor for supplying mixture to the combustion heater of a hydrocarbon motor.

Other objects and uses of the invention will appear from the following description taken in connection with the drawings which form a part of this specification and in which

Figure 1 is a vertical section through a carburetor and heating device built in accordance with my invention;

Figure 2 is a side elevation of the upper part of the device shown in Figure 1;

Figure 3 is a section similar to that of Figure 2, showing another form of auxiliary carburetor and float chamber; and

Figure 4 is an enlarged transverse section on the line 4—4 of Figure 1.

Referring to the drawings, 10 represents generally a carburetor adapted to supply mixture to the cylinders of a hydrocarbon motor. It comprises a mixing chamber 11 at the outlet end of which is arranged a throttle valve 12 which may be manually controlled to thereby determine the amount of mixture which shall pass to the motor. The carburetor 10 also comprises a mixing tube 13 of venturi form arranged in the lower part of the chamber 11. A fuel nozzle 14

projects upwardly into the tube 13 and is supplied with gasoline or other liquid fuel through a passage 15 from a float chamber, 16, in which chamber a float 17 controls a valve 18 through a pair of small weighted levers 19. The chamber 16 receives the liquid fuel from a supply pipe 20 and the valve 18 controls a port 21 connecting the tube 20 with the interior of the float chamber. The upper opening in the float chamber is closed by a removable cover 22 in which the levers 19 are supported as shown.

The main carburetor 10 also has main and auxiliary air intakes 23 and 24 respectively, the former communicating with the lower end of the tube 13 and the latter communicating directly with the lower part of the mixing chamber 11 which surrounds the tube 13.

This form of carburetor as described above is in general use and is known as the "Packard" carburetor. In operation the suction of the motor draws air through the intakes 23 and 24 into the mixing chamber 11. Fuel is also drawn through the nozzle 14 and mixes with the air passing through the tube 13. The additional air supplied by the intake 24 mixes with the air and gasoline in the upper part of the chamber 11 and passes to the motor as a combustible mixture, the amount depending upon the degree of opening of the throttle valve 18.

Connected to the upper end of the carburetor 10 is a motor intake pipe 25 which may be branched as shown in Figure 2 and the interior of this pipe forms a conduit which is merely a continuation of the mixing chamber 11 above referred to and of course communicates therewith.

In the upper part of the pipe 25 is an opening 26 and mounted directly over this opening and secured to the intake pipe, as by bolts 27, is a combustion heater device 28. The adjacent wall of this device is cut away to form an opening 29 opposite the opening 26 and a plate 30 of corrugated cross section is clamped between the device 28 and the intake pipe so that it forms a wall or separation between the interior of the intake pipe and the interior of the heater device 28. This corrugated wall permits of rapid transfer of heat from the heater device to the gases in the intake pipe.

The combustion heater device has an inlet

31 and an outlet 32, at opposite ends, and screens 33 and 34 are arranged over the inlet and outlet respectively to prevent backfire through the inlet and to prevent fire passing out through the outlet. The screen 33 also assists in breaking up the mixture before it reaches the vicinity of the spark plug. The outlet 32 is connected to the interior of the pipe or conduit 25 above the throttle valve 12 by a pipe 35 so that the suction of the motor is communicated to the interior of the heater device 28 and any burnt gases therein are carried into the conduit 25 to thereby heat the mixture passing through said conduit.

The heater device 28 has an igniter, shown in the form of a spark plug 36, the terminals 37 of which, when connected to a suitable battery, will supply a spark for igniting a mixture in said heater device.

The heater device 28 is also formed with an air inlet port 38 which may be controlled either by a hand operated valve 39 or a spring controlled automatic valve 40. The valve 39 may be operated alone, as by locking the valve 40 in inoperative position, or it may operate in conjunction with the valve 40 so that the valve 39 will supply some air to the port 38 and the valve 40 will supply additional air as the suction increases. Also the valve 39 may be closed and the valve 40 only operated to supply air to the port 38. It will be understood that the air supplied through the port 38 will be for the purpose of thinning the mixture supplied to the device 28 by the means hereinafter described.

Two independently operating means are illustrated in Figure 1 for supplying mixture to the combustion chamber of the heater device 28. One of these means comprises a small or auxiliary carburetor 41 which will be formed as an integral part of the casting of the float chamber 16. An extension in the form of a well 42 is connected to the interior of the float chamber and at one side thereof and a fuel nozzle 43 extends upwardly from said well into an air chamber 44. Extending downwardly into the air chamber 44 and around the upper end of the nozzle 43 is an outlet tube 45, the interior of which forms a mixing chamber 46 for the air and gasoline entering said chamber. An air port 47 supplies air to the chamber 44 and the outlet tube 45 is provided with a check valve 48 which will prevent backfire into the carburetor.

The outlet 45 connects through a pipe 49, a valve 50 and a pipe 51 with the inlet 31 of the combustion chamber of the heater 28, the valve 50 being shown as connecting the pipes 49 and 51.

It will be understood that the suction in the heater 28, due to the connection 35 with the intake pipe, will draw mixture through the pipes 49 and 51 from the auxiliary carbu-

retor 41 and this mixture will be ignited by the igniter 36. It may be a richer mixture than will readily ignite and this will be thinned down by the air entering at the port 38 so that the correct mixture will be reached somewhere between the inlet and the outlet and be burned in the chamber. The burned gas will pass out through the outlet 32 and the pipe 35 into the conduit 25 where it will mix with and heat the mixture passing from the main carburetor 10 to the motor. Heat from the burning mixture in the heater 28 will also be transferred through the plate 30 to the mixture in the conduit 25.

The other means for supplying mixture to the heater 28 comprises a pipe 52 which extends from the valve 50 into the mixing chamber 11 of the carburetor 10 immediately above and across the top of the mixing tube 13. This pipe 52 has a slot 53 in its underneath side, which slot is long and narrow as shown in Figures 1 and 4. Its length, however, is somewhat less than the interior diameter of the tube 13 so that it catches only that part of the mixture passing through the tube which is substantially in the middle part of the tube. That part of the mixture usually comprises smaller particles of liquid fuel than the mixture near the wall of the tube so that the pipe 52 receives a small quantity from the best part of the mixture passing through said tube 13. This slot or inlet 53 also accomplishes a further breaking up of the mixture as it enters the pipe 52.

When the valve 50 is turned to connect the pipe 52 with the pipe 51, the mixture drawn from the tube 13 passes through the pipe 52 and the pipe 51 to the inlet 31 of the heater device 28 where it is fired by the igniter 36 as hereinabove described.

In Figure 3 an auxiliary carburetor of the compensating type is illustrated. This carburetor is also formed as a part of the float chamber 16 and has a well 54 which communicates through a restricted port 55 with the interior of a fuel tube 56, which tube extends downwardly from a plug 57 and bottoms on a plug 58. The tube 56 is also arranged in a chamber 59 having a port 60 connecting it with the air space in the upper part of the float chamber 16, and the tube 56 is also formed with a series of ports 61 near its lower end. At its upper end the tube 56 has outlet ports 62 and there is an air port 63 surrounding the tube above the port 60. The outlet 64 of the carburetor communicates with a pipe 65 which corresponds to the pipe 51 of the form shown in Figure 1 and of course leads to the intake 31 of the heater device 28.

In operation, the carburetor shown in Figure 3 gives a rich mixture for starting and a less rich mixture for running conditions. When suction is created in the pipe 65 gasoline and air are drawn from the chamber 59

through and around the tube 56. This gives a rich mixture of gasoline and air, but as soon as the gasoline in the chamber 59 has dropped below the ports 61 the tube 56 can receive gasoline only through the restricted port 55. Thereafter air is drawn into the tube 56 through port 60, chamber 59, and ports 61, which air mixes with the gasoline entering the bottom of the tube at the port 55. This forms an emulsion of gasoline and air which is further diluted by air which reaches the outlet 64 through the port 63. A vent 66 in the cover of the float chamber 16 supplies air to that chamber.

Other forms of devices than that shown may be made without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a hydrocarbon motor, the combination with a motor intake pipe having an opening therein, of a combustion heater secured to said pipe and having an opening registering with the opening in said pipe, and a corrugated plate forming a wall separating the combustion chamber from the interior of the intake pipe.

2. In a hydrocarbon motor, the combination with a motor intake pipe having an opening therein, of a combustion heater secured to said pipe and having an opening registering with the opening in said pipe, and a corrugated plate arranged in said openings.

3. In a hydrocarbon motor, the combination with a motor intake pipe, of a combustion heater mounted thereon, and a corrugated plate connected between the intake pipe and the combustion heater.

4. In a hydrocarbon motor, the combination with a motor intake pipe having a top opening, a combustion heater device mounted on said pipe over said opening and a plate set between said pipe and device and forming a wall therebetween.

5. In a carburetor for hydrocarbon motors, the combination with the mixing chamber, a mixing tube, and a fuel nozzle in said tube, of a combustion heater device arranged adjacent said mixing chamber, and means connected to said carburetor immediately above said tube for withdrawing mixture from said tube and carrying it into said device.

6. In a hydrocarbon motor, the combination with a carburetor and intake conduit, of a combustion heater device mounted in heating relation to said conduit, a conduit connected to said carburetor to withdraw mixture therefrom and supply it to said device, a conduit leading from said device to said intake conduit, and air admission means for said device adjacent the outlet therefrom.

7. In a hydrocarbon motor, the combination with a combustion heater device, of a carburetor for supplying mixture to said device, and a check valve between said carburetor and said device to prevent backfire.

8. In a hydrocarbon motor, the combination with a combustion heater device, of two independently operating means for supplying mixture to said device, and means for connecting either one or the other of said mixture supplying means to said device.

9. In a carburetor for hydrocarbon motors, the combination with the mixing chamber thereof, a mixing tube, and a fuel nozzle in said tube, of a device for withdrawing a portion of the mixture from said carburetor comprising a pipe extending across said mixing chamber above said mixing tube and having an opening to receive the mixture.

10. In a carburetor for hydrocarbon motors, the combination with the mixing chamber thereof, a mixing tube, and a fuel nozzle in said tube, of a device for withdrawing a portion of the mixture from said carburetor comprising a pipe extending across said mixing chamber above said mixing tube and having an opening to receive the mixture, said opening being in the form of a slot of narrow cross section.

11. In a carburetor for hydrocarbon motors, the combination with the mixing chamber thereof, a mixing tube, and a fuel nozzle in said tube, of a device for withdrawing a portion of the mixture from said carburetor comprising a pipe extending across said mixing chamber above said mixing tube and having an opening to receive the mixture, said opening being in the form of a slot extending along part only of the diameter of the interior of said mixing tube.

12. In a carburetor, the combination with the mixture passage therein and the fuel inlet into the mixture passage, of a device for withdrawing a portion of the mixture from said carburetor comprising a pipe extending across the mixture passage and having an opening towards the fuel inlet.

13. In a carburetor, the combination with the mixture passage therein and the fuel inlet into the mixture passage, of a device for withdrawing a portion of the mixture from said carburetor comprising a pipe extending across the mixture passage and having an opening towards and adjacent the fuel inlet.

14. In a carburetor, the combination with the mixture passage therein and the fuel inlet into the mixture passage, of a device for withdrawing a portion of the mixture from said carburetor, said device extending across the mixture passage and having its

inlet opening directly in line with the flow of fuel from the fuel inlet.

15. In a carburetor and motor intake conduit, the combination with the mixture passage in the carburetor and the fuel inlet into the mixture passage, of a combustion heater device, and means for withdrawing a portion of the mixture from said carburetor and carrying it into said device, said means having its inlet opening substantially vertically above said fuel inlet.

16. In a carburetor and motor intake conduit, the combination with the mixture passage in the carburetor and the fuel and air inlets in the lower part of said passage, of a combustion heater device, and means for withdrawing mixture from said carburetor and carrying it into said device, said means having its inlet opening arranged substantially vertically above said fuel and air inlets.

17. In a carburetor, the combination with the mixing chamber thereof and the fuel and air inlets at the lower part of said chamber, of a combustion heater adapted to draw its mixture from the carburetor and having its inlet opening therefor substantially vertically above the carburetor fuel inlet.

18. In a hydrocarbon motor, the combination with the intake conduit and the carburetor for supplying mixture thereto, of a combustion heater device for said intake conduit, a pipe connected to said carburetor to withdraw mixture therefrom to supply said device, an auxiliary carburetor for supplying mixture to said device, and means for connecting one of said mixture

supplying means to said device and disconnecting the other, and vice versa.

19. In a hydrocarbon motor, the combination with a carburetor and intake conduit, of a combustion heater device, a conduit connected to said carburetor to withdraw mixture therefrom and supply it through an inlet to said device, outlet means from said device to the intake conduit, air admission means between said inlet and outlet, and an igniter in the device between said inlet and said air admission means.

20. The method of producing heated fuel mixture for internal combustion engines which consists in causing the suction of the intake passage to produce a delivery thereto of liquid fuel and air, diverting a substantially fixed proportion of said liquid delivery, combustibly combining a flow of air with such diverted fuel in proportions adapted to maintain a clean-burning mixture and admitting the combustion products to the engine intake.

21. Means for producing heated charge mixture for internal combustion engines, comprising an intake passage, means for producing an upward flow of a mixture of liquid fuel and air therein, means for diverting a substantially constant fraction of the liquid from said upward flow and means for admitting a proportional amount of air to said liquid adapted to produce steady burning of said fuel and means for delivering the products to said passage.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.