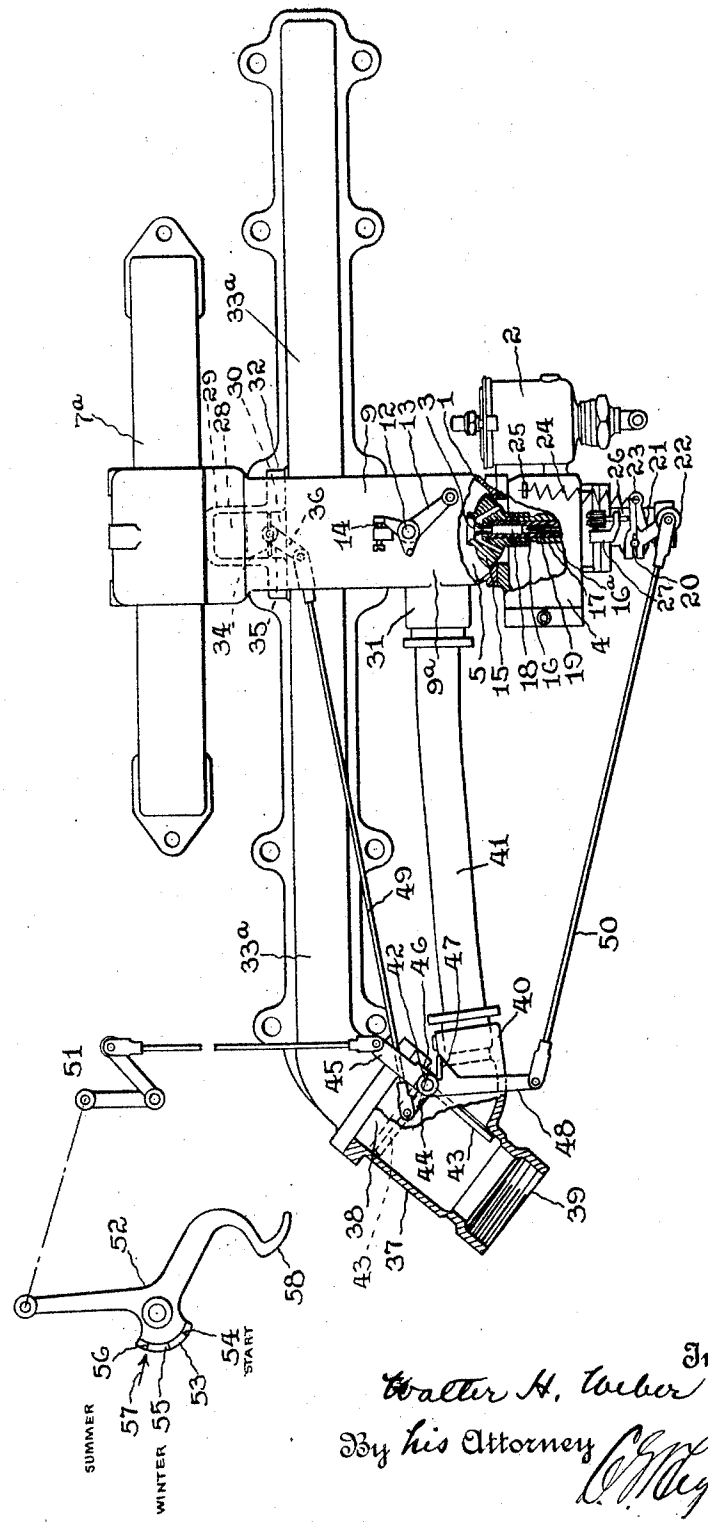
Feb. 16, 1932. W. H. WEBER 1,846,008

CARBURETING APPARATUS

Filed Oct. 6, 1927 2 Sheets-Sheet 1

Fig. 1.



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Fig. 5.

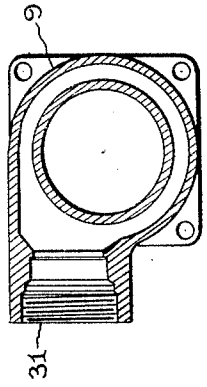


Fig. 4.

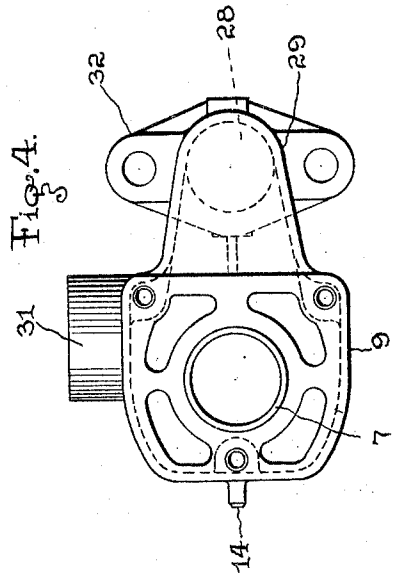


Fig. 3.

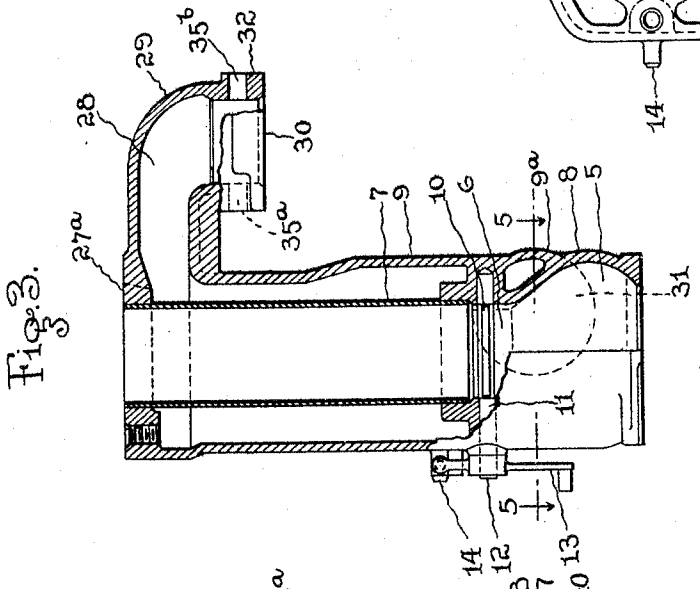
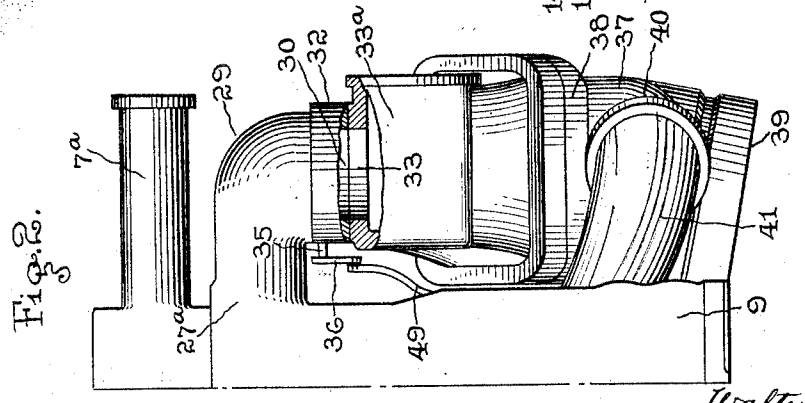


Fig. 2.



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Patented Feb. 16, 1932

1,846,008

UNITED STATES PATENT OFFICE

WALTER H. WEBER, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT LUBRICATOR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

CARBURETING APPARATUS

Application filed October 6, 1927. Serial No, 224,291.

My invention relates to new and useful improvements in carbureting apparatus for internal combustion engines, and more particularly to heater means for the fuel mixture.

An object of my invention is to provide means to heat the combustible mixture fed to an internal combustion engine by utilization of the hot exhaust gases.

Another object is to provide means to control the temperature at which the combustible mixture is delivered to the engine.

Another object is to provide for cooperative relation between the temperature and fuel controls.

The invention consists in the improved construction and combination of parts, to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, I have fully and clearly illustrated a preferred embodiment of my invention to be taken as a part of this specification, and wherein—

Figure 1 is a side elevation of my device, having parts broken away to show the internal construction, certain parts being in section;

Fig. 2 is an end view from the right of Fig. 1, partly in section, and with the fuel reservoir and lower portion of the carburetor removed;

Fig. 3 is a vertical central sectional view of the jacketed part of the carburetor and the uptake;

Fig. 4 is a plan view of the jacketed part shown in Fig. 3, and

Fig. 5 is a sectional view on line 5—5 of Fig. 3.

Referring to the drawings by characters of reference, 1 designates, generally, a carburetor having a fuel reservoir 2 fed from a tank or other source (not shown), and which supplies liquid fuel to the carburetor mixing chamber at the fuel inlet 3. The carburetor also has an air inlet 4 which may, if desired, be connected to a stove or air heater (not shown) for preheating the air entering the carburetor, as is well known in the art. The air inlet 4 and the fuel inlet 3 open into a mixing chamber 5, which has a mixture outlet 6. From the outlet 6 rises an uptake tube or conduit 7, the wall of which is preferably of material having high heat conductivity. Surrounding the mixing chamber 5 and sealed to the wall 8 thereof at its lower end 9^a, is a jacket 9 which extends upward around the uptake 7 (Fig. 3). The mixing chamber outlet 6 is controlled by a throttle valve 10, preferably of the butterfly or plate type, which is fixed on a shaft 11 journalled in the wall 8 of the mixing chamber, and having one end 12 projecting through both the wall of the chamber 5 and the jacket 9. Secured on the shaft end 12 is an operating lever 13, the movement thereof and of the valve 10 being limited by an adjustable stop 14 on the outside wall of the jacket 9.

The air inlet 4 to the mixing chamber is controlled by a suction operated air valve 15 having a stem 16 which has a sliding fit in a guide or hollow boss 17 fixed to the carburetor casing within the air inlet 4. The stem 16 has a longitudinal bore 18 which opens through the air valve 15 into the mixing chamber, and at its other end the bore 18 receives liquid fuel from the reservoir 2. Within the bore 18 is a constriction 16^a which forms a valve port or orifice which is controlled by a metering pin 19 which is movable longitudinally of bore 18 and into and out of the orifice 16^a. The metering pin or valve 19 may be operated by any well known mechanism, such as a rack and pinion (not shown), the pinion being fixed on a shaft 20 journaled in the carburetor casing. On one end of shaft 20 which projects through the casing, is an operating lever 21, preferably of the bell-crank type, having an operating arm 22 and a stop arm 23. Acting upon the arm 23 is one end of a spring 24, which I have shown as a coil spring under tension, the other end engaging an abutment 25 on the carburetor casing. Spring 24 tends to raise the arm 23 against an adjustable abutment 26 which is preferably a thumb screw threaded through a support 27, and also to rotate the shaft 20 and its pinion counterclockwise to raise the metering pin or needle valve 19 to control the area of the fuel inlet at orifice 16^a.

The carburetor shown and described is of the well-known "Stewart" type, the structure thereof being well known, and which, in and of themselves constitute no part of my invention, and, therefore, a more detailed illustration and description thereof is unnecessary. The carburetor is merely shown by way of example as illustrating one type of carburetor and fuel supply control therefor, to which my invention is applicable, and constitutes one of the elements thereof in combination. My invention is not limited in its application to this type of carburetor, but contemplates application to or inclusion of any type of carburetor and supplied with means for controlling or regulating the supply of liquid fuel thereto.

The uptake conduit 7 opens into an intake manifold 7ª for the engine cylinders (not shown), the manifold serving to close the passage between the uptake 7 and the jacket 9 at its upper end 27ª. The jacket 9 is provided with an inlet 28 through a conduit or neck 29 which opens downward, as at 30, and with an outlet 31, respectively, at its top 27ª and bottom 9ª. In the inlet 28 which is adapted to be connected by a flange 32 to a port 33 in the engine exhaust manifold 33ª, is a control valve 34, preferably of the plate type, mounted on a shaft 35 journaled in bearings 35ª, 35ᵇ in the wall of the neck 29 adjacent its union with the exhaust manifold. One end of shaft 35 extends through the wall of neck 29 and carries a valve operating lever 36.

Between the exhaust manifold 33ª and the exhaust pipe (not shown), I provide a connecting fitting 37 having a main inlet 38, an outlet 39, and an inlet branch 40. A pipe or conduit 41 connects the branch inlet 40 with the outlet 31 from the jacket 9. Journaled through the fitting 37 in a plane transverse to a common plane through the center lines of the main and branch inlets 38, 40, respectively, is a shaft 42. Carried by and rotatable with this shaft is a flap valve 43 which is adapted upon rotation of the shaft to close either the main inlet 38 or the branch inlet 40. Fixed on one end of the shaft 42 which projects through the fitting, are two levers 44, 45, set at an angle to each other of substantially ninety degrees. The lever 45 has an operating or cam face 46 for engagement, upon clockwise movement of the lever, with an abutment 47 which projects laterally from a third lever 48 freely mounted on the shaft 42 for rotation thereabout. The levers 44 and 36 are connected for dependent operation by a link or rod 49, and the levers 48 and 22 are also connected by a member 50 for dependent movement. Suitable links and levers 51 connect the lever 45 with a remote control member 52 which is preferably provided with a scale 53 bearing indicia 54, 55, 56 to indicate, in conjunction with a fixed mark 57, the setting of the hereinbefore described mechanism.

The operation of my invention is as follows: There are three main positions or settings of the system which I prefer to designate as "Starting", "Winter", and "Summer", and which correspond, respectively, to the points 54, 55, 56. The device having been assembled as shown in Fig. 1, and connected to an engine, with the control member 52 within easy reach of the engine operator, for example on the dash-board of a motor vehicle, the member 52 is rotated clockwise by the hand grip 58 to "Starting" position when the marks 54 and 57 register. This manipulation of member 52 will rotate shaft 42 clockwise, raising valve 43 to close inlet 38, moving rod 49 from left to right of Fig. 1 to open valve 34 and causing cam face 46 to engage abutment 47 to operate through rod 50 to rotate shaft 20 and its pinion (not shown) to depress the needle valve or metering pin 19 and open orifice 16ª. If the engine is now started, the suction through the caburetor will draw a proportionaly large quantity of liquid fuel into the mixing chamber 5 to give the "rich" or "overrich" mixture, due to wide open orifice 16ª, desirable for starting. The hot exhaust from the engine as it starts running, will pass into the exhaust manifold 33ª, but will be prevented from passing direct to the fitting 37 and the exhaust pipe (not shown) by the valve 43, and since the inlet 30 to the jacket 9 is open past valve 34, the exhaust will be bypassed to flow through conduit or neck 29, jacket 9, conduit 41 and beyond valve 43 into the fitting 37, from which it will pass through outlet 39 into the exhaust pipe. It is evident that the exhaust gases in passing from the engine through the heater, as described, will heat the uptake 7 and consequently heat the combustible mixture being fed therethrough to the engine. When the engine has started to run, the control member 52 is returned manually by counterclockwise movement until the fixed mark 57 registers at some point on the scale intermediate the marks 54 and 55, as is determined by the operator to be the position for proper "warming up" of the engine. In this position of the lever 52 the metering pin or valve 19 will still be depressed so that the fuel orifice 16ª will still supply an "overrich" amount of fuel to the mixing chamber, and a large percentage of the engine exhaust gases will still be by-passed through the heater 9. The "warming up" period for the engine is of short duration, for example, usually less than one mile of driving at average speed in winter weather. When the engine is warm enough to run on the normal mixture proportions of fuel and air, the operator will rotate the dash control lever 52 further in a counterclockwise direction until the marks 55 and 57 register; this will move the valve 43 to partially open the inlet 38, will move the valve 34

to partially cut off the flow of exhaust gases through neck or conduit 29, and will release the lever 48 so that spring 24 can return the metering pin 19, to its normal running position with respect to orifice 16ª. When the system is so adjusted, with marks 55, 57 in register, the flow of liquid fuel from nozzle 3 will be controlled by the air valve 15 in a manner well known in carburetors of the Stewart type, a part of the exhaust gases will pass directly from the exhaust manifold through inlet 38 to the exhaust pipe, and the remaining part will be by-passed through neck 29, jacket 9 and conduit or passage 41 to the exhaust pipe. Since only a part of the gases are passing through the jacket 9 when marks 55, 57 register, the mixture fed to the engine will be heated to a lesser degree, but sufficiently to obtain maximum efficiency of motor operation for cold weather driving. When it is desired to pass an unheated mixture to the engine, as is the case in hot weather or hot climates, the control member 52 is returned manually still further until marks 56, 57 register, as shown in Fig. 1, thus operating valve 34 to close the conduit 29 from the exhaust manifold, moving valve 43 to close branch inlet 40, and causing substantially all of the exhaust from the manifold to pass directly to and through fitting 37. Since by this adjustment the cam face 46 is moved away from and out of contact with abutment 47, movement of member 52 will not affect the position of the metering pin 19. The exhaust gases will now, in "Summer" position, all pass directly to the fitting 37 through inlet 38, as the conduit 28 is closed by valve 34 and the exhaust gases therefore cannot be by-passed to heat the uptake 7, which being cold will deliver a cold mixture to the inlet manifold.

It is of course understood that the control member 52 may be moved between "Winter" and "Summer" positions, without affecting the setting of the needle valve 19, but if so moved will vary the amount of hot gases passing through jacket 9, and therefore the temperature of the combustible mixture fed to the engine.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A carburetor comprising exhaust gas heating means, means to control the flow of exhaust gases to said heating means, a liquid fuel supply passage for the carburetor, a valve in said passage, means to regulate said control means independently of said valve, and operating means for said valve engaged upon predetermined movement of said regulating means to operate said valve.

2. A carburetor comprising a mixing chamber having a jacket, a passage to convey exhaust gases to said jacket to heat said mixing chamber, a valve in said passage, a liquid fuel supply inlet to said mixing chamber, said inlet having a valve, and means interconnecting said valves.

3. A carburetor comprising a mixing chamber having a jacket, a passage to convey exhaust gases to said jacket, a passage to convey exhaust gases from said jacket, a fuel inlet to said mixing chamber, a valve in said fuel inlet, one of said passages having a valve operable independently of said fuel valve, and means operable upon predetermined movement of said passage valve to operate said fuel valve.

4. A carburetor comprising a mixing chamber having a heating jacket, an inlet to said jacket, an outlet from said jacket, a valve in said inlet, a valve in said outlet, means interconnecting said valves, a fuel inlet to said mixing chamber, a valve for said fuel inlet, and means interconnecting said means and said fuel valve.

5. A device of the character described comprising an intake manifold and an exhaust manifold, a carburetor adapted to supply explosive mixture to said inlet manifold, a jacket for said carburetor, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a fuel inlet to said carburetor, a valve to control said fuel inlet, means interconnecting said valves, and means to permit independent movement of one of said valves relative to the other.

6. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor adapted to supply explosive mixture to said inlet manifold, a jacket for said carburetor having an inlet at its upper end and an outlet at its lower end, a conduit connecting said exhaust manifold and said jacket inlet, a conduit connecting said outlet and the inlet end of said exhaust manifold, and a valve in said exhaust manifold at its junction with said outlet conduit, said valve having a plurality of positions, adapted in one position to close said exhaust manifold and in another position to close said outlet conduit.

7. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor having a jacket, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a second conduit connecting said jacket and said exhaust manifold, a valve at the junction of said exhaust manifold and said second conduit adapted to close said exhaust manifold or said second conduit, and means interconnecting said valves.

8. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor having a jacket, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a second conduit connecting said jacket and said exhaust manifold, a valve at the junction of said exhaust manifold and said second conduit

adapted to close said exhaust manifold or said second conduit, means connecting said valves for simultaneous closing of said first conduit and said second conduit, an operating member, and means connecting said member and said connecting means for remote control of said valves.

9. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor having a jacket, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a second conduit connecting said jacket and said exhaust manifold, a valve at the junction of said exhaust manifold and said second conduit adapted to close said exhaust manifold or said second conduit, a fuel inlet to said carburetor, a valve in said fuel inlet, and means connecting said valves for interrelated movement.

10. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor having a jacket, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a second conduit connecting said jacket and said exhaust manifold, a valve at the junction of said exhaust manifold and said second conduit adapted to close said exhaust manifold or said second conduit, a connecting rod between said valves for simultaneous movement thereof, a fuel inlet to said carburetor, a valve in said fuel inlet, and means operatively connecting said fuel valve and said connecting rod.

11. A device of the character described comprising an inlet manifold and an exhaust manifold, a carburetor having a jacket, a conduit connecting said exhaust manifold and said jacket, a valve in said conduit, a second conduit connecting said jacket and said exhaust manifold, a valve at the junction of said exhaust manifold and said second conduit adapted to close said exhaust manifold or said second conduit, a connecting rod between said valves for simultaneous movement thereof, a fuel inlet to said carburetor, a valve in said fuel inlet, a connection between said fuel valve and said connecting rod, and means on said connection to permit movement of one of said first-named valves independent of said fuel valve.

12. A device of the character described comprising an exhaust manifold, a carburetor having a jacket forming a heating chamber, an exhaust passage opening from said manifold into said chamber at one end thereof, a second exhaust passage opening from the other end of said chamber into said exhaust manifold, a shaft at the junction of said manifold and said second passage substantially transverse to the central common plane of said manifold and said second passage at their junction, a valve fixed on said shaft adapted to close said manifold or said second passage, and means to operate said valve.

13. A device of the character described comprising an exhaust manifold, an exhaust passage opening into said manifold, a shaft at the junction of said manifold and said passage substantially transverse to the central common plane of said manifold and said passage at their junction, a valve fixed on said shaft adapted to close said manifold or said passage, a carburetor having a jacket and fuel inlet control means, said jacket having flow connections to said manifold and to said passage, a lever journaled on said shaft, means connecting said lever and said control means, a lever fixed on said shaft having means to engage said first-named lever for movement of said control means.

14. A device of the character described, comprising a carburetor having a mixture outlet, a jacket for said mixture outlet, said jacket having inlet and outlet flow connections adapted to be connected to an exhaust manifold, valve means for by-passing a regulatable flow of exhaust gases to and from said jacket, said carburetor having a fuel inlet, a valve to control said fuel inlet, means to regulate said valve means independently of said valve, and means operable by said regulating means at maximum by-passing of exhaust gases through said jacket to operate said valve to increase fuel feed to the carburetor.

In testimony whereof I have hereunto subscribed my name.

WALTER H. WEBER.