

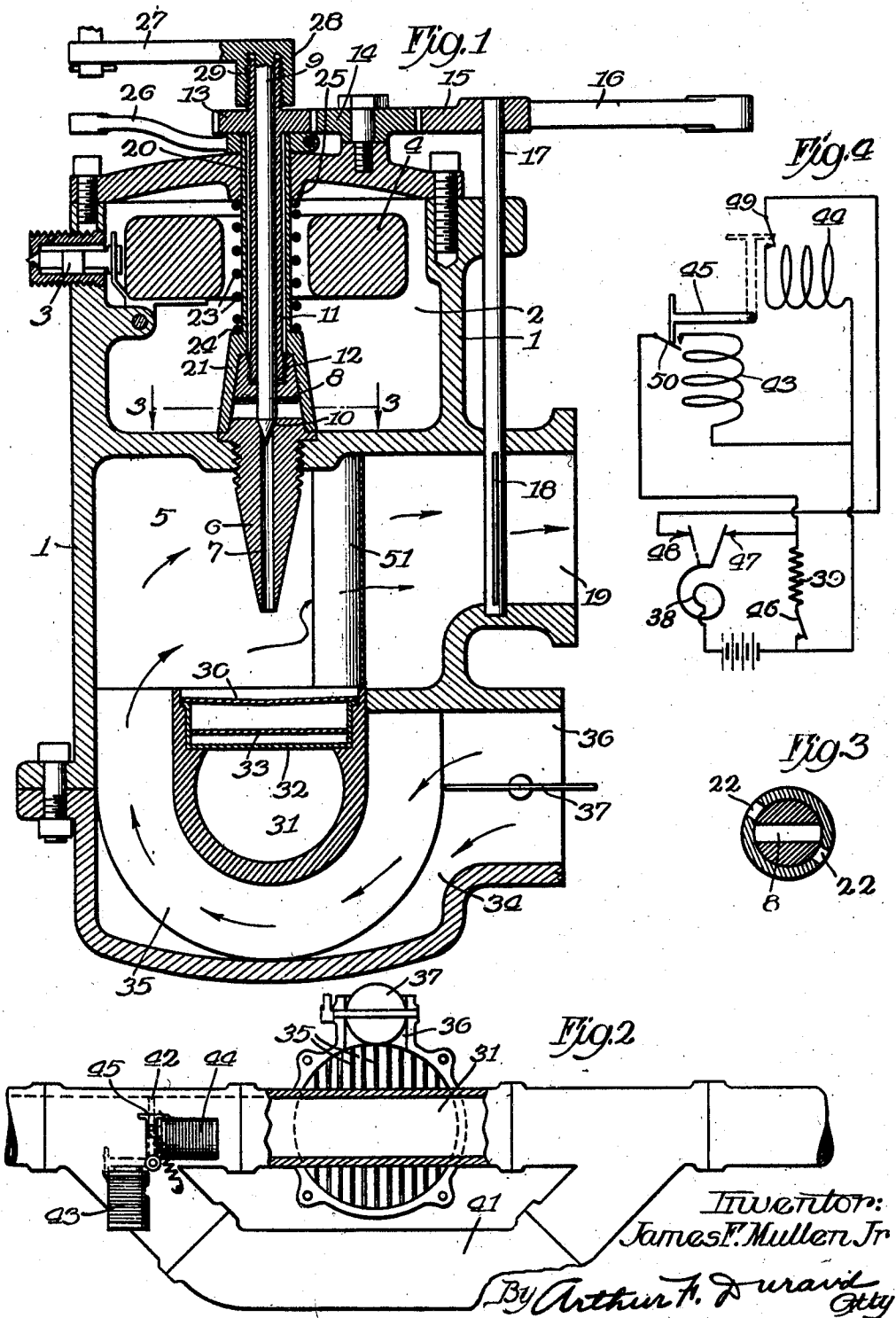
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CARBURETOR

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UNITED STATES PATENT OFFICE

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CARBURETOR

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This invention relates to carburetors, and more particularly to carburetors having means for preheating the air and to those having means for vaporizing the liquid fuel.

5 Generally stated, the object of the invention is to provide a novel and improved construction whereby the pre-heating of the air is accomplished primarily or momentarily by an electric heating element, but is under
10 thermostatic control, whereby the circuit of the heating element is automatically opened, and whereby the heat of the exhaust from the engine is then used to maintain the temperature necessary for vaporizing the liquid
15 fuel, and for heating the air.

Another object is to provide novel and improved means for feeding the liquid fuel by gravity into the mixing chamber of the carburetor.

20 Another object is to provide a novel and improved construction whereby the needle valve of the carburetor, when opened, need not be closed to shut off the supply of liquid fuel to the mixing chamber of the carburetor, another valve ahead of the needle valve
25 in the path of the liquid being employed for this purpose, whereby the liquid fuel can be turned on and shut off without disturbing the needle valve.

30 Another object is to provide a novel and improved construction and arrangement whereby the throttle valve which controls the admission of the mixture from the carburetor to the engine is connected with the
35 needle valve, whereby both valves are controllable by one lever, or by one controller.

Another object is to provide novel and improved means for heating the air before it enters the mixing chamber of the carburetor.

40 Another object is to provide automatic electric control over the exhaust, so that the exhaust will be automatically shunted into a by-pass when the liquid-fuel vaporizing means becomes too hot, and whereby the ex-
45 haust will be automatically returned to the passage for heating the vaporizing means, and for preheating the air, as soon as the said vaporizing means has been cooled down to a lower temperature.

50 It is also an object to provide certain de-

tails and features of construction tending to increase the general efficiency and desirability of a carburetor of this particular construction, as will hereinafter more fully appear.

To these and other useful ends, the invention consists in the matters hereinafter set forth and claimed, and shown in the accompanying drawings, in which,—

Fig. 1 is a vertical section of a carburetor
60 involving the principles of the invention.

Fig. 2 is a view on a smaller scale, looking down on certain portions of said carburetor, with certain portions thereof shown broken away or omitted for convenience of
65 illustration.

Fig. 3 is a cross section on line 3—3 of Fig. 1.

Fig. 4 is a diagrammatic view showing the electric circuit connections of certain
70 heating elements shown and described.

As thus illustrated, the invention comprises a carburetor body 1 having an upper liquid-fuel chamber 2 therein provided with an inlet valve 3 controlled by the float 4, so
75 that liquid fuel will enter, from any suitable source, as soon as the float moves downward. The carburetor body 1 also has a mixing chamber 5 therein, below said fuel chamber, and this mixing chamber has a fuel nozzle 6 extending downward therein, which
80 nozzle has a vertical fuel passage 7 communicating with a transverse passage 8 in the upper portion of this nozzle, which upper
85 portion and which transverse passage 8 are in the upper fuel chamber 2 of the carburetor. A needle valve 9 extends downward through the carburetor, and its lower pointed portion engages the seat 10 formed in the upper end
90 of the passage 7, as shown. A sleeve 11 surrounds the needle valve and is threaded at its lower end portion to engage the threaded socket 12, which has a right-hand thread, in the upper end portion of the said nozzle 6, as shown. The upper portion of this sleeve
95 11 is provided with a gear 13, which gear engages an idler gear 14 suitably mounted on the top of the carburetor, while the toothed segment 15 engages the said idler gear. This segment 15 is rigid with the le- 100

ver 16, and is also rigid with a vertically disposed rock shaft or stem 17 of the throttle valve 18, which latter is disposed in the passage 19 leading from the mixing chamber 5 to the intake manifold of the engine. Another sleeve 20 surrounds the sleeve 11 and is provided at its lower end with an enlarged and flaring portion 21 having openings 22 to register with the passage 8 previously mentioned. A coiled spring 23 is provided on the sleeve 20, between the shoulder 24 and the shoulder 25, to yieldingly hold the valve member 21 downward upon the upwardly tapered portion of the nozzle 6, as shown.

A lever 26 is rigid with the sleeve 20, and a lever 27 is rigid with the needle valve 9, this lever 27 having a threaded portion 28 that engages the threaded portion 29, which has a left-hand thread, which is rigid with the gear 13, previously mentioned. The two screw threads 12 and 29 cause the needle valve 9 to move up and down twice as fast, of course, as would be the case with one thread. With this arrangement, the needle valve 9 and the throttle valve 18 are controlled simultaneously by a movement of the lever 16, in any desired manner. Through the medium of the lever 26, the valve member 21 is rotatable to turn on or shut off the flow of liquid fuel from the chamber 2 into the passage 8 and down through the passage 7 to the mixing chamber below. By movement of the lever 27, through the medium of the screw connection 29, the needle valve can be adjusted up and down, and held in adjusted relation to the sleeve 11 and the gear 13, in order to insure the desired results. When the lever 16 is operated, it causes rotation of the gear 13, and this, because of the screw connection 12, and the screw 29, causes the needle valve to move up and down.

Means are provided for vaporizing the liquid fuel, comprising a plate 30 below the nozzle 6, upon which the liquid fuel drips or feeds by gravity. The exhaust has a passage 31 below the plate 30, the exhaust passage being separated from the plate 30 by a plate 32, these two plates being of metal, and there is another plate 33, of mica or similar material, between the plates 30 and 32, as shown. The air intake chamber 34 below the exhaust passage 31 is provided with a number of parallel and vertically disposed copper plates 35, which become highly heated to heat the air which enters through the passage 36, and which then, when preheated, escapes upwardly into the mixing chamber, as shown. A valve or damper 37 is provided in the passage 36 to control the supply of air.

Means are provided for automatically controlling the temperature of the plate 30, and for controlling the exhaust, comprising a thermostat 38, preferably disposed between the plates 30 and 33, of any suitable character. An electric heating element 39 is pro-

vided between the plates 32 and 33 and connected in circuit with a battery 40 or other source of current, as shown in Fig. 4 of the drawings. It will be seen that the exhaust passage 31 has a by-pass passage 41 controlled by a damper or valve 42, which latter is controlled by the two electromagnets 43 and 44, through the medium of a common armature 45, whereby the valve or damper 42 may be swung back and forth to direct the exhaust either through the passage 31 or through the by-pass 41, as will hereinafter more fully appear.

Assuming that the automobile engine is cold and that it is desired to start the engine, the switch 46 in the battery circuit of the heating element 39 will be closed. At such time the thermostat circuit is closed at the stationary contact point 47, as shown in Fig. 4 of the drawings. At such time the exhaust passage 31 is open. As soon as the heat is sufficient, the thermostat opens the circuit of the heating element 39, and engages the stationary contact point 48, which closes a battery circuit through the electromagnet 44, whereby this magnet pulls up the armature 45 and closes the passage 31 automatically. The driver of the motor vehicle opens the switch 46 and the engine continues to operate, the liquid fuel being vaporized in the mixing chamber and mixed with the preheated air, thus providing a highly efficient fuel. As soon as the plate 30 has been cooled to a lower temperature, the thermostat 38 operates back into the position shown in Fig. 4, thereby closing through the electromagnet 43, causing the latter to pull down the armature 45 and thereby again open the exhaust passage 31 to provide exhaust heat for preheating the air and for vaporizing the liquid fuel. It will be seen that when the armature 45 was pulled upward by the magnet 44, the circuit of the latter was opened at 49, while the circuit of the magnet 43 was closed at 50; and, vice versa, when the armature 45 is pulled downward, it leaves the circuit of the magnet 44 closed and automatically opens the circuit of the magnet 43, in a manner that will be readily understood. Thus the thermostat serves automatically to keep the plate 30 at the proper temperature for vaporizing the liquid fuel.

Preferably, a baffle plate 51 is provided in the mixing chamber 5, in the path of the air, between the nozzle 6 and the throttle valve 18, so that the air will be somewhat checked and thoroughly mixed with the vaporized liquid fuel before escaping into the engine.

Obviously, the throttle 18 and the needle valve 9 can be operated as explained, through the medium of the lever 16, and the lever 26 and the valve 21 can be employed by the driver (by any suitable, known or approved means), to turn on and shut off the liquid fuel. Also, the lever 27 can be operated to change the

adjustment of the needle valve 9, to insure either a lean or a rich mixture, as may be required for the running of the motor vehicle.

Thus, when the valve 21 is open and when the needle valve is also open, fuel flows continuously from the fuel chamber 2 into the mixing chamber 5 and drips continuously upon the vaporizing plate 30, and in this way fuel is being vaporized in the chamber 5 while the intake valves of the engine are closed, as well as while said valves are open. The exhaust not only heats the plate 30, but it also heats the chamber 5, of course, and in this way also heats the chamber 2, whereby the temperature of the fuel in the chamber 2 is raised above normal before it flows by gravity into the mixing chamber.

It will be seen that the vaporizing surface provided by the wall 30 is depressed somewhat, below the bottom of said chamber, and is adapted to catch and retain the liquid fuel until the latter is entirely vaporized by the incoming air. Thus, in heating this surface, no liquid fuel can drip or flow away therefrom before it is fully vaporized, or substantially so.

Without disclaiming anything, and without prejudice to any novelty disclosed, what I claim as my invention is:

1. In an internal combustion engine carburetor, a fuel chamber, a mixing chamber, valve mechanism operable about a vertical axis for continuously feeding the liquid fuel by gravity from said fuel chamber into said mixing chamber, controllable manually to start and stop the engine, means providing a vaporizing surface upon which the liquid fuel drips or falls continuously, formed to support the liquid until it is fully vaporized, an air inlet for said chamber, and a mixture outlet for said chamber, said mechanism comprising a needle valve and a shut-off valve, each valve operable independently of the other, in combination with a throttle valve for said mixture outlet, and means for simultaneously controlling said needle valve and throttle valve.

2. An internal combustion engine carburetor comprising a mixing chamber, valve means operable about a vertical axis for dripping liquid fuel into said chamber, through the top thereof, an air inlet for said chamber, an exhaust heater in said air inlet, a by-pass extending around said heater, means for controlling the exhaust to cause it to pass either through said heater or through said by-pass, means for operating said valve means to start and stop the engine, and a mixture outlet for said mixing chamber.

3. A structure as specified in claim 2, said heater having its upper side provided with a vaporizer for receiving and retaining and vaporizing the liquid fuel.

4. A structure as specified in claim 2, said heater having its upper side provided with

a vaporizer for receiving and vaporizing the liquid fuel, in combination with electric means to heat said vaporizer in starting the engine.

5. In a carburetor, the combination of a casing providing an upper fuel chamber, a mixing chamber directly below said fuel chamber, an air inlet chamber directly below said mixing chamber, an outlet passage in the bottom of said fuel chamber for feeding the fuel by gravity into the mixing chamber, valve mechanism extending vertically in the fuel chamber to control said fuel outlet, a float in said fuel chamber, an inlet valve controlled by said float, means operable about a vertical axis for controlling said valve mechanism, and a mixture outlet for said mixing chamber.

6. A structure as specified in claim 5, said float being hinged at one side thereof to move up and down and extending circularly in the form of a ring around said valve mechanism.

7. A structure as specified in claim 5, said mixture outlet having a throttle valve geared to said valve mechanism.

8. A structure as specified in claim 5, in combination with an exhaust heater for heating said air inlet chamber and thereby heating said mixing chamber, and thereby heating said fuel chamber.

9. A structure as specified in claim 5, comprising an exhaust heater for heating said air inlet chamber to heat the incoming air, and a vaporizer heated by said exhaust heater, said vaporizer disposed in position to receive the falling liquid fuel, whereby the fuel is dropped through heated air on to a heated vaporizer.

10. In an internal combustion engine carburetor, the combination of means forming an air inlet chamber, a mixing chamber above said air inlet chamber, a liquid fuel chamber immediately above the mixing chamber, valve mechanism for dripping fuel from the fuel chamber into the mixing chamber, controllable for starting and stopping the engine, a throttle outlet for the mixing chamber, means connecting said valve mechanism and throttle together, means to control the throttle and thereby control said valve mechanism, and an exhaust heater for heating the air inlet chamber and the mixing chamber, and for thereby heating the fuel chamber.

11. A structure as specified in claim 10, said valve mechanism being adapted to feed the fuel continuously by gravity, causing the fuel to drip or fall through heated air in the mixing chamber on to the bottom of the heated mixing chamber.

12. A structure as specified in claim 10, said heater having a vaporizer to receive and vaporize the heated fuel from said fuel chamber, formed to support the liquid until it is fully vaporized.

13. An internal combustion engine car-

buretor, comprising means forming a vaporizing chamber, means forming a liquid fuel chamber immediately above said vaporizing chamber, valve mechanism for dripping liquid fuel by gravity from said fuel chamber into said vaporizing chamber, controllable about a vertical axis to start and stop the engine, and means forming an air inlet for said vaporizing chamber, together with means forming a mixture outlet for said vaporizing chamber, and valve mechanism comprising a needle valve, and a shut-off valve between said needle valve and said fuel chamber.

14. An internal combustion engine carburetor, comprising means forming a vaporizing chamber, means forming a liquid fuel chamber immediately above said vaporizing chamber, valve mechanism for dripping liquid fuel by gravity from said fuel chamber into said vaporizing chamber, controllable about a vertical axis to start and stop the engine, and means forming an air inlet for said vaporizing chamber, together with means forming a mixture outlet for said vaporizing chamber, said vaporizing chamber having its bottom provided with a vaporizing surface to catch the fuel, adapted to hold the fuel until it is fully vaporized by the incoming air, together with engine exhaust means directly under said vaporizing surface to heat the fuel and thereby expedite the vaporizing action, in combination with a by-pass around said exhaust heating means, and valve means controllable to cause the exhaust to pass through either said heating means or said by-pass.

15. An internal combustion engine carburetor, comprising means forming a vaporizing chamber, means forming a liquid fuel chamber immediately above said vaporizing chamber, valve mechanism for dripping liquid fuel by gravity from said fuel chamber into said vaporizing chamber, controllable about a vertical axis to start and stop the engine, and means forming an air inlet for said vaporizing chamber, together with means forming a mixture outlet for said vaporizing chamber, said vaporizing chamber having its bottom provided with a vaporizing surface to catch the fuel, adapted to hold the fuel until it is fully vaporized by the incoming air, in combination with electric heating means controllable for heating said vaporizing surface to start and stop the engine.

16. An internal combustion engine carburetor, comprising means forming a vaporizing chamber, means forming a liquid fuel chamber immediately above said vaporizing chamber, valve mechanism for dripping liquid fuel by gravity from said fuel chamber into said vaporizing chamber, controllable about a vertical axis to start and stop the engine, and means forming an air inlet for said vaporizing chamber, together with means

forming a mixture outlet for said vaporizing chamber, said vaporizing chamber having its bottom provided with a vaporizing surface to catch the fuel, adapted to hold the fuel until it is fully varorized by the incoming air, in combination with electric heating means controllable for heating said vaporizing surface to start and stop the engine, together with exhaust heating means for heating said vaporizing surface after said electric heating means is shut off.

17. An internal combustion engine carburetor, comprising means forming a vaporizing chamber, means forming a liquid fuel chamber immediately above said vaporizing chamber, valve mechanism for dropping liquid fuel by gravity from said fuel chamber into said vaporizing chamber, controllable about a vertical axis to start and stop the engine, and means forming an air inlet for said vaporizing chamber, together with means forming a mixture outlet for said vaporizing chamber, comprising a rotary shut-off valve associated with said needle valve, controlling the supply of liquid fuel to said needle valve.

Specification signed this 14th day of May, 1927.

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