July 6, 1926. 1,591,331

C. E. LINEBARGER

CARBURETOR

Filed Jan. 29, 1920

Fig. 1

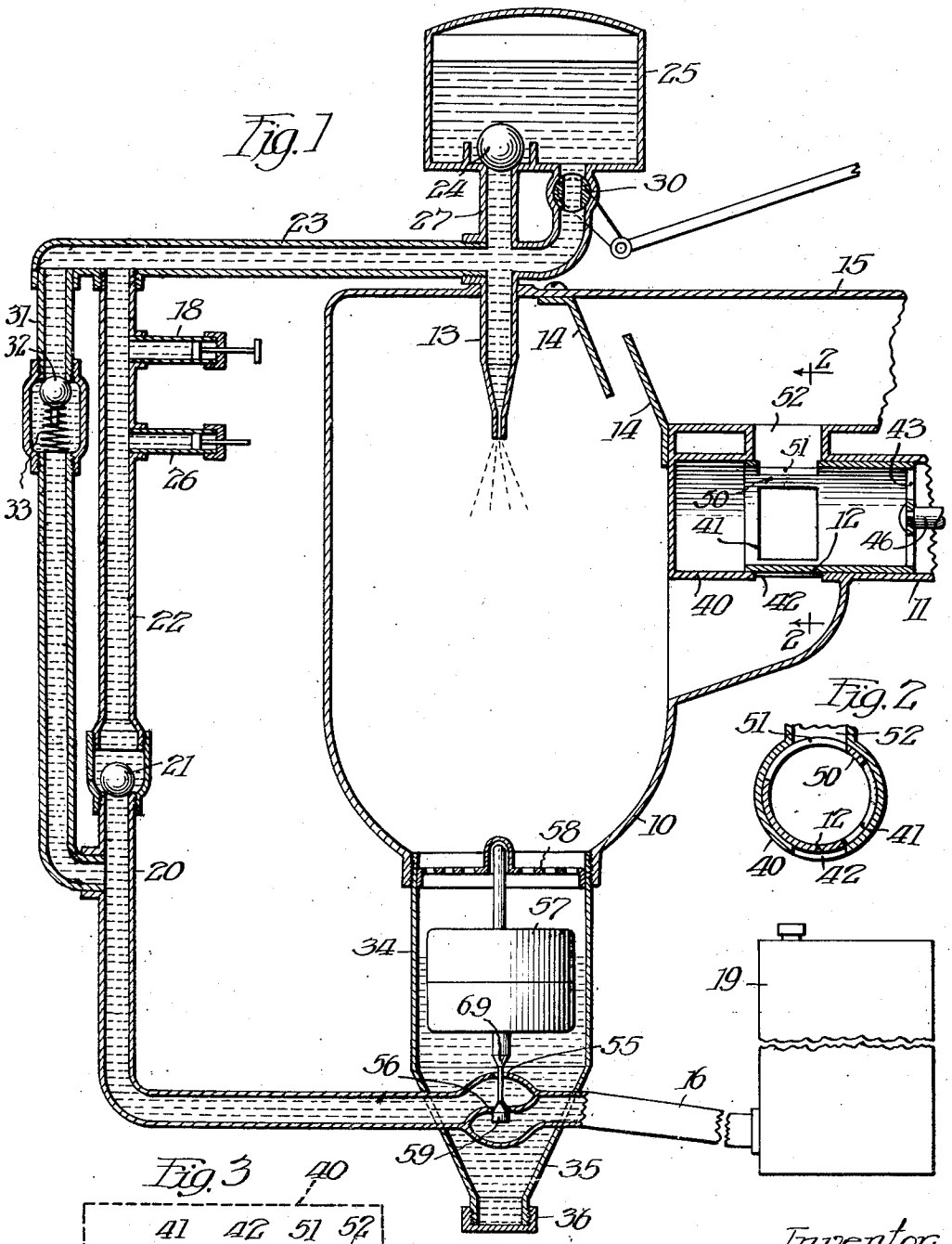
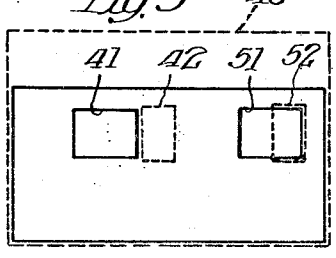


Fig. 2

Fig. 3



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UNITED STATES PATENT OFFICE.

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CARBURETOR.

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This invention relates to carburetors for internal combustion engines. One of the objects of the invention is to provide apparatus by means of which the air is more thoroughly mixed with the gasoline or other liquid fuel and in the proper constant proportions at all times, and particularly when there are sudden changes in the amount of air or fuel used. Another object is to manipulate and to wash the air being used so as to remove all dust and other objectionable substances from the air before the mixture passes into the cylinders of the engines.

Of the accompanying drawings Fig. 1 is a vertical central sectional view, largely diagrammatic, of apparatus which embodies the features of my invention; Fig. 2 is a section along the line 2—2 of Fig. 1; and Fig. 3 is a diagram illustrative of the device of Fig. 2.

To illustrate my invention I have considered it as applied to gasoline engines such as are used with automobiles or motor trucks or boats, although it is to be understood that it is applicable to any type of internal combustion engine using liquid fuel. In order to carry out the objects of my invention I provide a mixing chamber 10 into which air is forced by the atmosphere through a pipe 11 and a valve 12. In this mixing chamber I introduce a spray nozzle 13. Any nozzle which produces a suitable spray or mist of the oil may be used. The nozzle, when the engine is in operation, as hereinafter explained, is continuously sending a spray of gasoline downwardly through the mixing chamber and thereby mixing the gasoline with the incoming and upwardly moving air. The mixture then passes past the baffle plates 14, which serve to remove the larger drops of liquid from the mixture, and thence into the engine manifold 15, and thus into the various cylinders of the engine.

Gasoline is supplied to the spray nozzle from any suitable supply tank 19, through the pipe 16. It is to be understood that the tank could be in any suitable place, and ordinarily would be in the rear of the vehicle and normally would be lower than the mixing chamber. In starting the apparatus, by means of a hand pump 18, the gasoline may be pumped up through a pipe 20 from the tank, past a check valve 21, through the pipe 22, and finally through the pipe 23 into and through the spray nozzle 13, and the engine may then be started by means of this gasoline in any ordinary manner. After the engine is started a pump 26, operated continuously by the engine, maintains a spray of gasoline under suitable pressure.

As the pump continues to operate, in ordinary use, the pressure of gasoline generated in the pipe 23 will be sufficient to operate the spraying device and also to force the gasoline upwardly through the pipe 27 past the check valve 24 and into the airdome 25. The air in this dome will be compressed, and both the air and the gasoline in the dome will then be under substantially the same pressure as the pressure produced by the pump in its normal operation. Hence if the engine is stopped for any reason, thus stopping the operation of the pump 26, the engine may be started without operating the hand pump 18 by opening the valve 30 so as to allow gasoline in the dome 25 to be forced down by the compressed air through the spray nozzle 13, and to thus produce a substantially normal spraying of the gasoline into the incoming air. This dome may be considered as a storage tank.

In order to maintain a predetermined pressure on the gasoline, due to the operation of the pump 26, any suitable means may be provided, such as the by-pass 31 in which mounted a valve 32 held closed by means of the spring 33. When the pressure in the pipe 23 acting on the valve 32 exceeds that of the spring 33 the valve will open and the gasoline will merely circulate through the by-pass without increasing the pressure of the gasoline.

As the gasoline is sprayed downwardly through the mixing chamber, and thus through the incoming air, the gasoline condenses upon particles of dust which may be in the incoming air and the particles are thus carried downward into the sump chamber 35. From the sump chamber any objectionable substance may be removed in any suitable manner, such as by removing the cap 36. In this manner the air passing into the mixing chamber is washed clean by the descending gasoline as it is mixing with the gasoline.

As the cross section of the mixing chamber is much larger than that of the pipe 11, the speed of the air is greatly reduced as it passes into and upwardly through the mixing chamber. As a consequence the air

is unable to force upwardly against gravity much of the dust ordinarily present in the air, and this dust settles into the sump irrespective of the gasoline spray. The slower speed of the air also allows time for the mixture of the air and gasoline mist to become very complete; and the large capacity of the chamber reduces materially the pulsations of the air due to the action of the engine pistons.

The amount of gasoline sprayed into the mixing chamber is maintained at all times substantially constant, and materially more than is taken up by the air; thus insuring ample supply for the air at the highest speeds. The gasoline not taken up by the air passes into the float chamber 34, and normally passes thence through the valve port 55 into the spraying apparatus through the pipe 20, or into the gasoline tank through the valve port 56 and pipe 16. In order to prevent pumping air into the spraying apparatus through the port 55, a float 57 is provided and a valve 69 fixed to the float is adapted to close the port 55, when the gasoline in the float chamber 34 allows the float to sink to a predetermined point. And in order to prevent flooding of the mixing chamber when the automobile is inclined so as to raise the gasoline tank above the mixing chamber, a valve 59, fixed to the float, is adapted to close the port 56. By this arrangement when, for any reason, the gasoline rises in the float chamber to a predetermined point the port 56 will be closed and the gasoline will be pumped from the float chamber until it sinks so that the port 56 will open and the pump will take gasoline from the tank again.

The valve 12 may be of any suitable type. I prefer for the purpose a cylindrical valve which is placed within a valve casing 40, and which is rotatable and slidable within the casing. An opening 41 in the valve may thus be brought into registry with the opening 42 in the valve casing. The air passing in through the pipe 11 may then pass through the openings 43 and out through the openings 41 and 42. In order to vary the size of the valve port it is necessary only to rotate the valve 12, or to slide it longitudinally with reference to the casing 40. The valve 12 is fixed to a valve operating stem 46 in any suitable manner, the stem being rotatably and slidably mounted in the tube 11 or in the frame of the machine. The valve stem 46 passes outwardly from the casing and, by any suitable means, the valve may be operated from the dash board so as to vary the amount of air passing into the mixing chamber.

In order to still further control the relative proportions of gasoline and air I provide a valve 50, positioned between the intake 11 and the manifold 15, so that more or less air may be allowed to pass from the intake pipe to the manifold without passing into the mixing chamber. This valve may be of any suitable type; but I prefer for the purpose a valve similar to the valve 12. In this instance I have combined the two valves in one structure, the valve 50 being in the cylinder 12 on the side opposite to the opening 41, and comprising an opening 51 which may register with the opening 52 in the casing 40. By means of this valve the amount of air, if any, which is allowed to pass directly from the intake to the manifold may be varied to suit the conditions, and both the mixing valve 12 and the shunting valve 50 may be operated by the same stem 46 and suitable connecting means. By rotating the cylinder 12 in the casing 40 the relative sizes of the valve ports may be varied; and by shifting them relatively horizontally the port sizes may be varied proportionally.

A screen 58, between the mixing chamber and the float chamber prevents the passage of undesirable substances, brought in by the air or otherwise, from passing into the supply tank or spraying apparatus.

It will be seen that, by means of the apparatus, which I have provided, the air passing into the cylinders of the engine is thoroughly washed by the spray of gasoline or other liquid fuel and a very intimate mixture of air and fuel in the form of vapor, or finely atomized mist, is produced, and the mixture may be diluted by fresh air as much as may be desired. Also the operator has ample control over the apparatus being able by simple movements to deliver to the cylinders of the engine at any time a mixture of air and fuel in such quantities and proportions as to best contribute to its efficient performance. Also the fuel spray is not appreciably influenced by sudden changes in the speed of the air; and as the air always passes through the finely sprayed fuel, sudden increases in the supply of air will not tend to carry into the engine cylinders improperly atomized masses of fuel.

It is to be understood, however, that although I have described with some detail the various elements of the apparatus used in carrying out my invention, yet modifications therein may be made by those skilled in the art without departing from the spirit of my invention as disclosed by the following claims.

I claim as my invention:

1. In a carburetor a mixing chamber, means for spraying an excess of liquid fuel downwardly through said chamber, means for passing air upwardly through said chamber, a supply tank operatively communicating with said spraying means and with the lower portions of said chamber, said tank

being positioned normally lower than said chamber, and means for disconnecting said tank from said spraying means when said tank is raised above said chamber.

2. The combination of a carburetor having a mixing chamber and fuel feeding means therefor, said means comprising a tank, a pipe connecting said tank with the mixing chamber of said carburetor, a check valve in said pipe to prevent the flow of liquid back into said tank, means adapted to be continuously operated for pumping fuel past said valve and forcing it into said mixing chamber, a second pipe with one end connected to said first mentioned pipe between the said tank and valve and with the other end connected to said pipe between said pumping means and said chamber, a valve in said second pipe and yielding means tending to close said valve against the pressure generated by said pump.

3. The combination of a carburetor and fuel feeding means therefor, said means comprising a tank, a pipe connecting said tank with the mixing chamber of said carburetor, a check valve in said pipe to prevent the flow of liquid back into said tank, means adapted to be operated for pumping fuel past said valve and forcing it into said mixing chamber, a second pipe with one end connected to said first mentioned pipe between the said tank and valve and with the other end connected to said pipe between said pumping means and said chamber, a valve in said second pipe, yielding means tending to close said valve against the pressure generated by said pump, and a storage tank mounted above and operatively communicating with said chamber, and said first mentioned pipe.

4. The combination of a carburetor and fuel feeding means therefor, said carburetor having a mixing chamber and a float chamber beneath said mixing chamber, communicating means between said two chambers, a float mounted in said float chamber, a fuel tank, a pipe connecting said tank with said float chamber, a valve in said pipe adapted to be closed by said float as it rises, a fuel inlet in said mixing chamber, a pipe connecting said float chamber with said fuel inlet, and means for closing the connection of said last mentioned pipe with said float chamber as said float sinks and for opening said valve, said valve being mounted in a partition between said two pipes.

5. The combination of a carburetor and fuel feeding means therefor, said carburetor having a mixing chamber and a float chamber beneath said mixing chamber, means for affecting communication between said two chambers, a float mounted in said float chamber, a fuel tank, a pipe connecting said tank with said float chamber, a valve in said pipe adapted to be closed by said float as it rises, a fuel inlet in said mixing chamber, a pipe connecting said float chamber with said fuel inlet, means for closing the connection of said last mentioned pipe with said float chamber as said float sinks and for opening said valve, said valve being mounted in a partition between said two pipes, and means for pumping fuel from said float chamber to said inlet.

6. The combination of a carburetor and fuel feeding means therefor, said carburetor having a mixing chamber and a float chamber beneath said mixing chamber, communicating means between said two chambers, a float mounted in said float chamber, a fuel tank, a pipe connecting said tank with said float chamber, a valve in said pipe adapted to be closed by said float as it rises, a fuel inlet in said mixing chamber, a pipe connecting said float chamber with said inlet, means for closing the connection of said last mentioned pipe with said float chamber as said float sinks and for opening said valve, said valve being mounted in a partition between said two pipes, means for pumping fuel from said float chamber to said inlet, and means for maintaining uniform the pressure of fuel produced at said inlet by said pumping means.

7. A carburetor having a mixing chamber, and a fuel inlet, mounted in said chamber, a surplus fuel chamber beneath but communicating with said mixing chamber, a fuel tank, a pipe connecting the said fuel chamber with said fuel inlet, a pipe connecting said fuel chamber with said tank, a valve port in each of said pipes, a check valve associated with each of said ports, a float in said fuel chamber for opening the port of said tank pipe and for closing the port of said fuel inlet pipe as the fuel in said chamber sinks, the valve of said tank-pipe port being positioned between said tank and said tank pipe port.

8. A carburetor having a mixing chamber, and a fuel inlet, a surplus fuel chamber beneath but communicating with said mixing chamber, a fuel tank, pipes connecting said fuel chamber with said fuel inlet and with said tank, a valve port in each of said pipes, a check valve associated with each port, and means depending on the fuel level in said fuel chamber for opening and closing each of said valves, one of said ports being arranged to operatively connect said pipes when the other port is closed, said tank-port valve being positioned on the tank side of its port.

9. The combination of a carburetor, a fuel tank, and a float chamber, said carburetor having a mixing chamber, a first passageway connecting said two chambers, a second passageway connecting said fuel tank and float chamber, and a third passageway connecting said float chamber and said mixing

chamber, power operable means in said third passageway for forcing fuel from said float chamber to said mixing chamber, and manually operable means in said third passageway for forcing fuel from said float chamber to said mixing chamber.

10. The combination of a carburetor, a fuel tank, and a float chamber, said carburetor having a mixing chamber, a first passageway connecting said two chambers, a second passageway connecting said fuel tank and float chamber, and a third passageway connecting said float chamber and said mixing chamber, power operable means in said third passageway for forcing fuel from said float chamber to said mixing chamber, a storage chamber above said mixing chamber, and manually operable means for placing said storage chamber in communication with said third passageway.

In testimony whereof, I hereunto set my hand.

CHARLES E. LINEBARGER.