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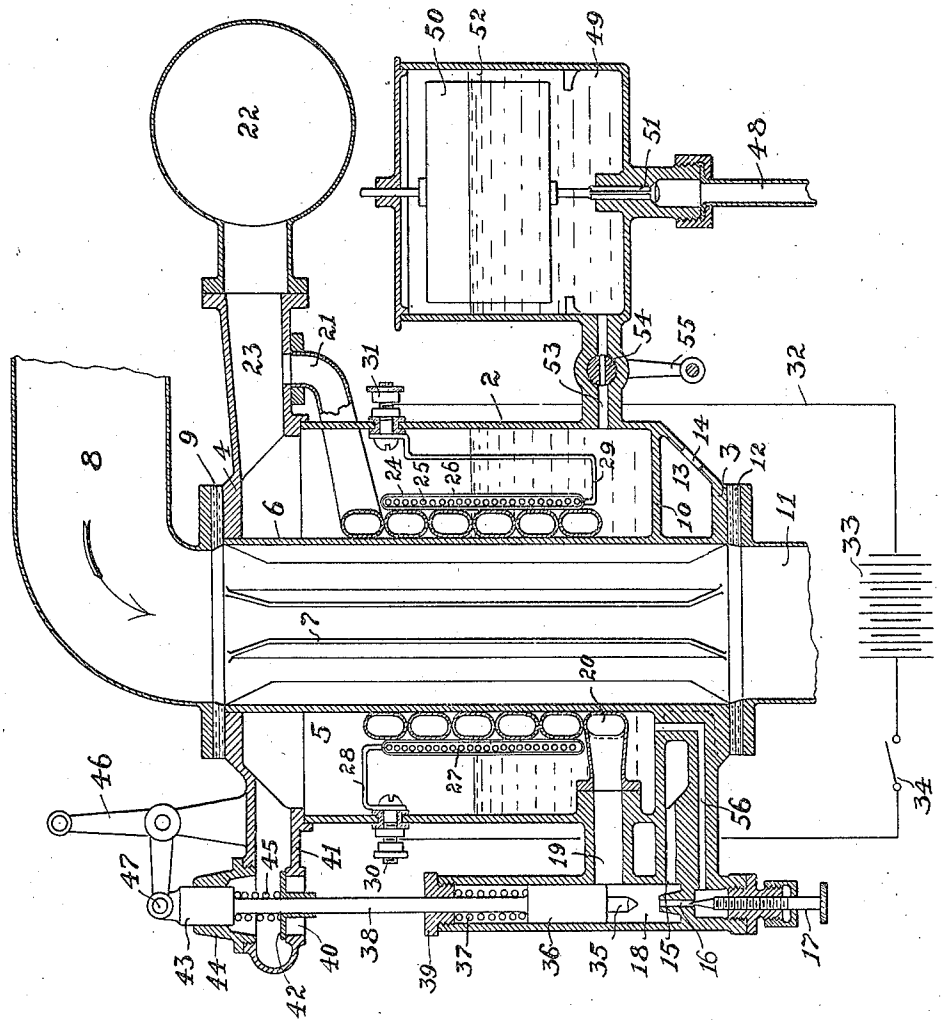
CARBURETER.

APPLICATION FILED JUNE 12, 1918.

1,311,532. Patented July 29, 1919.

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# UNITED STATES PATENT OFFICE.

ALBERT SCHMID, OF LONG BEACH, NEW YORK.

## CARBURETER.

1,311,532. Specification of Letters Patent. Patented July 29, 1919.

Application filed June 12, 1918. Serial No. 239,685.

*To all whom it may concern:*

Be it known that I, ALBERT SCHMID, a citizen of the United States, and a resident of Long Beach, L. I., New York, have made a new and useful Invention in Carbureters, of which the following is a specification.

This invention relates to charge forming devices for internal combustion engines and more particularly to devices supplemental to the main carbureter for forming combustible charges for starting and during the warming up period.

The use of heavy not readily inflammable liquid fuel such as kerosene and distillates and some of the so called commercial gasolenes in internal combustion engines, and especially in engines subject to varying loads makes it important that some means be provided by which readily combustible charges may be supplied during the warming up periods or until the engine becomes warm enough to care for the charges supplied by the main charge forming device or carbureter.

I find that it is impracticable in most cases to heat the main carbureter, either by electricity or other means, sufficiently to form proper charges during the warming up period. An object of this invention is to provide a supplemental or auxiliary starting charge forming device by means of which (during the warming up periods and until the engine is sufficiently warm to be operated upon the main carbureter) readily combustible charges may be supplied independently of the main carbureter.

A further object is to provide an efficient electrically heated device of this character which with a relatively small consumption of electric energy will effectively heat the fuel content of the starting charges in such manner that when the charges reach the engine cylinders they will be readily inflammable and will burn with a minimum of objectionable deposit or smoke.

This as well as other objects, which will readily appear to those skilled in this particular art, I attain by means of the device illustrated in the single sheet of drawings accompanying and forming a part of this application and in which the figure represents in sectional elevation a carbureter embodying this invention.

The device primarily consists of a tortuous passage through which the combustible charges, or at least the fuel content thereof, pass, an electric heater in heat transferring relation to said passage and a liquid agent having relatively great capacity for heat storage and which is in heat transferring relation with reference to said tortuous passage and said electric heater.

In my application Serial No. 239,684, filed concurrently herewith I have shown a solid heat storage agent instead of the liquid agent of this application.

The form of device shown in the drawings consists of a housing 2 having a base 3 and a cap or cover 4 whereby an annular chamber 5 is formed. The base is provided with a tubular member 6 formed integrally with the base 3 and side walls 2 and which rises centrally from the base and passes through a central opening formed for its reception in cap 4.

The inner surface of tubular member 6 is provided with radial heat absorbing ribs 7 which extend longitudinally thereof so that the heat from the exhaust gases derived from the engine to which the device is attached may be readily transferred to the tubular member proper and through its walls to chamber 5 surrounding same.

Cap 4 is preferably insulated from exhaust pipe 8 by means of an insulating gasket 9 formed of fiber or vulcanite or other suitable heat insulating material. The tubular member 6 extends a short distance below floor 10 of the base member 3 and to the lower face of the base member which is connected to an exhaust pipe 11 but spaced therefrom by means of an insulating gasket 12 similar to gasket 9. Base 3 is provided with an air chamber 13 surrounding the lower portion of tubular member 6 and provided with an air inlet 14 and an air outlet 15. The outlet 15 is adjacent to a fuel nozzle 16 the effective area of which is controlled by a needle valve 17. The air outlet 15 and the fuel nozzle communicate with tubular chamber 18 in communication through a passage 19 with a tubular conduit 20. This conduit 20 is formed of a metal tube preferably copper coiled about the outer surface of tubular member 6 so as to form a tortuous passage for the mixture composed of the air delivered through outlet 15 and the liquid fuel delivered through nozzle 16. The outlet 21 of the tortuous passage communicates with the engine inlet manifold 22 and with

the interior of the chamber 5 through an intermediate passage 23 which connects said chamber to the inlet manifold.

Surrounding and in contact with the outer surface of the coil forming the tortuous passage for the mixture is an electric heater element 24 made up of resistance wire 25, an outer case 26 and insulating material 27 arranged so as to space the convolutions of said wire one from the other and from the outer case. The resistance wire by means of connectors 28 and 29 and terminals 30 and 31 is connected in a circuit 32 supplied with energy from a storage battery 33 (any other suitable source of electric energy may serve) and the circuit is controlled by means of a switch 34. Fuel nozzle 16 is controlled by means of a valve 35 slidably mounted within tubular member 18 and which has an enlarged portion 36 serving as a guide and also as a valve for controlling the inlet to passage 19. A coil spring 37 surrounding the stem 38 of valve 35 and located between the upper face of enlarged portion 36 and an inclosure cap 39 tends to yieldingly force said valve toward its seat.

An auxiliary air inlet 40 is provided in an extension 41 of cap 4 axially in line with fuel nozzle 16 and the valve 42 slidably mounted on valve stem 38 controls the auxiliary air inlet.

Valve stem 38 at its upper end is provided with an enlargement 43 which passes through a bore in cap 44; said cap being threaded into cover 4 in line with the auxiliary air inlet 40. This enlargement serves as a closure for said bore and as a guide for the valve stem, and, between the lower face of this enlargement and the upper face of valve 42 a spring 45 is interposed. This spring tends to yieldingly hold valve 42 to its seat.

A bell crank 46 under the control of the operator is operatively connected at 47 to the upper end of valve stem 38 so that the operator can control the operation of the device.

Fuel nozzle 16 derives its fuel from any suitable source of supply through a pipe 48 which connects with a float chamber 49 of any well known construction having a float 50 and a valve 51 for controlling the level of liquid 52 within the float chamber.

The float chamber is connected with chamber 5 through a passage 53 controlled by a valve 54 having a lever arm 55. Chamber 5 connects with the fuel nozzle through a liquid passage 56 formed in the base and from this construction it will be seen that the level of liquid in chamber 5 will be the same as the level in float chamber 52 so long as valve 54 is open. The liquid 52 in chamber 5 is arranged to cover about one-half of the electric heater and the tube forming the tortuous passage and acts as a heat storage medium. The lighter fractions of the liquid which will be the fuel used in the device of course will vaporize and the hot vapors together with the vaporous mixture in the upper half of the tortuous passage will be super-heated by the electric heater and later by the heat derived from the exhaust gases through tubular member 6, and, in superheated condition will pass to the engine inlet manifold. The auxiliary air entering inlet 40 in its passage around the hot tubular member 6 will be heated and in this state mingle with the vapors arising from the heat storage liquid in chamber 5 and the mixture passing through the tortuous passage.

Having thus described my invention what I claim is—

1. In a charge forming device for internal combustion engines, a fuel nozzle, a tortuous passage communicating therewith, means for electrically heating said passage, means for passing exhaust gases in heat conducting relation to said passage, and a heat storage agent arranged in heat transferring relation to said passage and comprising a body of liquid arranged so as to absorb heat from said electric heater and said exhaust gases.

2. In a charge forming device for internal combustion engines, a fuel nozzle, a fuel passage communicating therewith, means for electrically heating said fuel passage, means for passing exhaust gases in heat conducting relation to said passage and a liquid fuel heat storage body in contact with said fuel passage and said electric heating means.

3. In a charge forming device for internal combustion engines, a chamber in open communication with the engine inlet manifold, a body of heat storage liquid in said chamber, means for passing exhaust gases in heat conducting relation to said liquid, means for automatically maintaining the level of said body of liquid, a conduit passing through said liquid and connected with the engine inlet and means for supplying said conduit with fuel.

4. A charge forming device for internal combustion engines, comprising means for forming relative rich mixtures of liquid fuel and air, a tortuous passage between said means and the engine inlet manifold, an electric heater for said passage, means for passing exhaust gases in heat transferring relation to said passage, and a liquid heat storage agent surrounding said passage and arranged in heat transferring relation thereto.

5. In a charge forming device for internal combustion engines, a walled passage for exhaust gases, a tube coiled around said passage and having its outlet in communication with the engine inlet manifold, a fuel nozzle communicating with the inlet of said

tube, a valve controlling said fuel nozzle, an electric heater in heat transferring relation to said tube, a chamber surrounding said walled passage, said tube and said heater, and a heat storage body of liquid within said chamber in contact with said passage, said tube and said electric heater.

6. In a charge forming device for internal combustion engines, a fuel nozzle, a tortuous passage communicating therewith, means for electrically heating said passage and a heat storage body of liquid arranged in contact with said electric heater.

7. In a charge forming device for internal combustion engines, a fuel nozzle, a fuel passage communicating therewith, means for electrically heating said fuel passage and a heat storage body of liquid in contact with said fuel passage and said electric heating means.

8. In a charge forming device for internal combustion engines, a tortuous tubular passage connected to the engine inlet manifold, means for supplying said passage with fuel, means for passing exhaust gases in heat transferring relation to said passage, a chamber surrounding said passage, an electric heater in said chamber and surrounding said passage and means for maintaining a supply of liquid fuel in said chamber.

In testimony whereof, I have hereunto subscribed my name this 7th day of June, 1918.

ALBERT SCHMID.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."