Jan. 7, 1941. W. T. DOWNS 2,227,927

COOLING APPARATUS

Filed May 24, 1938 3 Sheets-Sheet 1

FIG. 1.

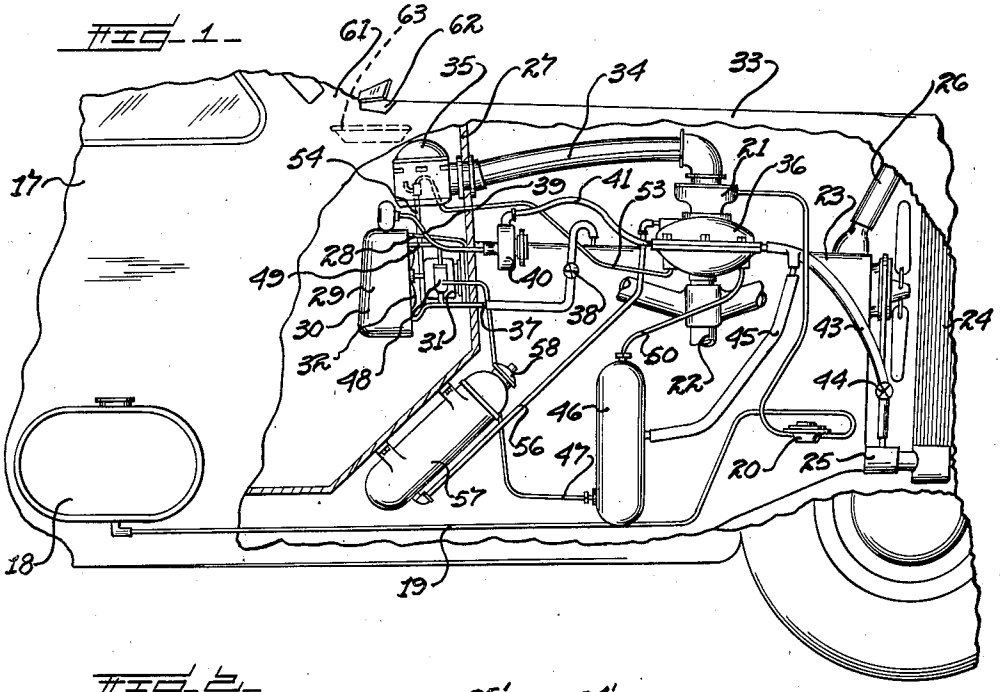


FIG. 2.

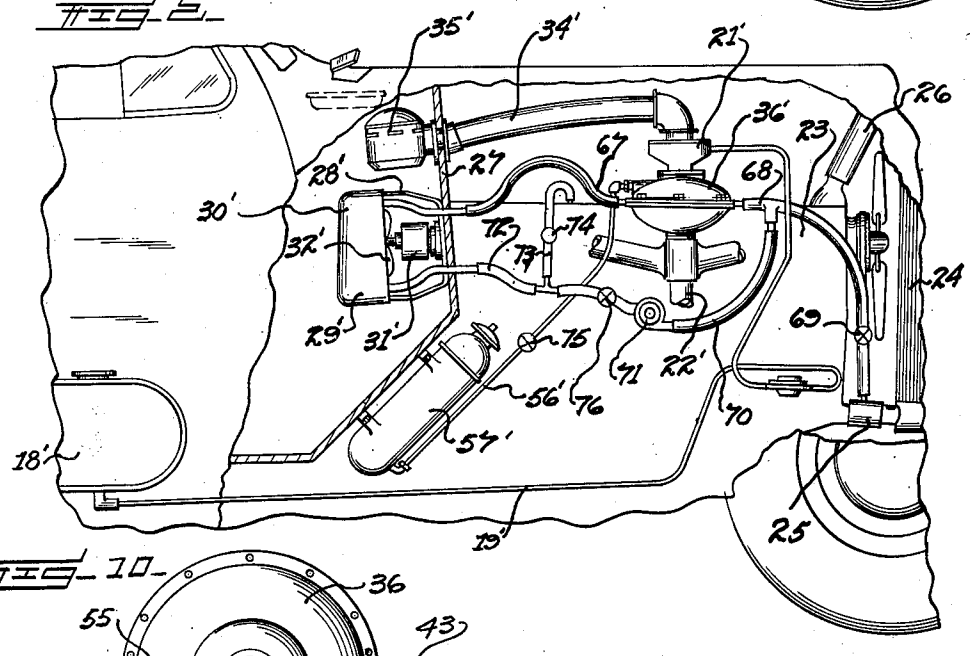
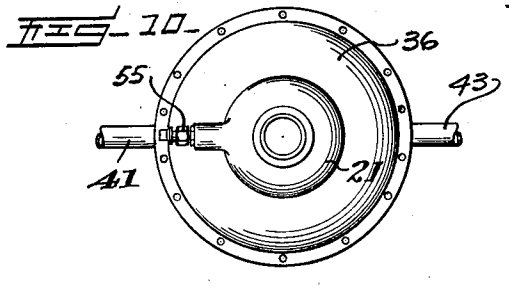


FIG. 10.



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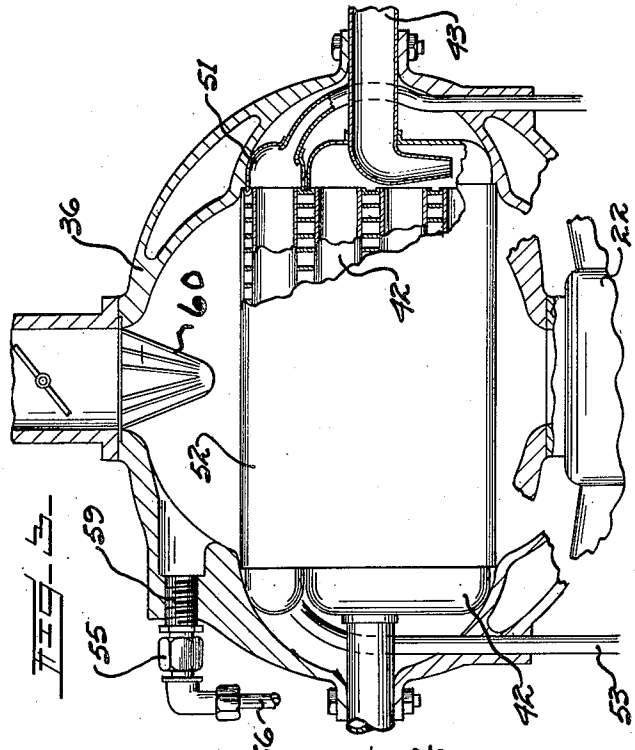


FIG. 4

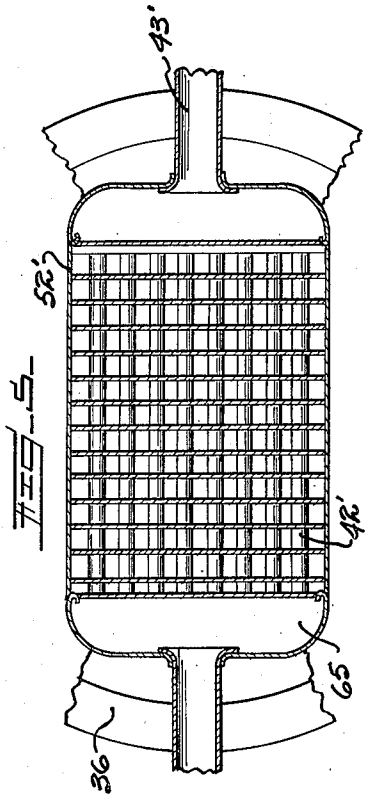
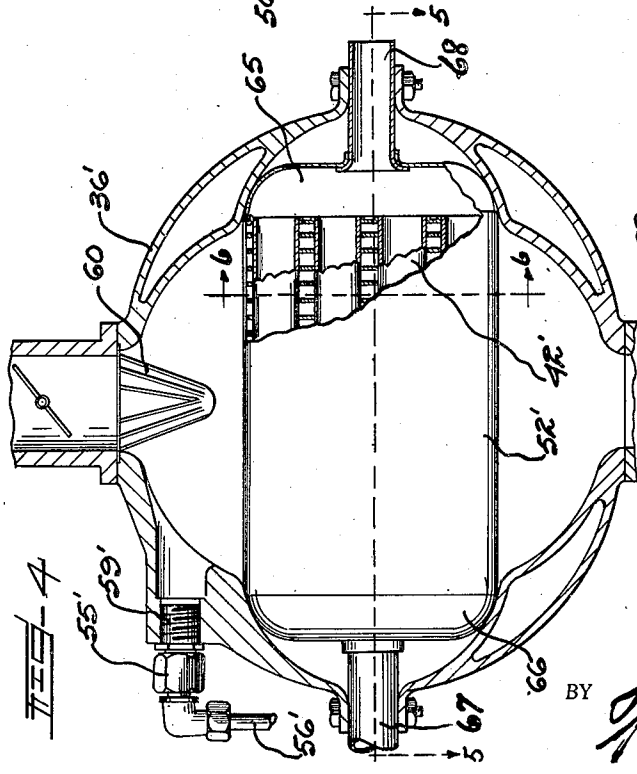


FIG. 5



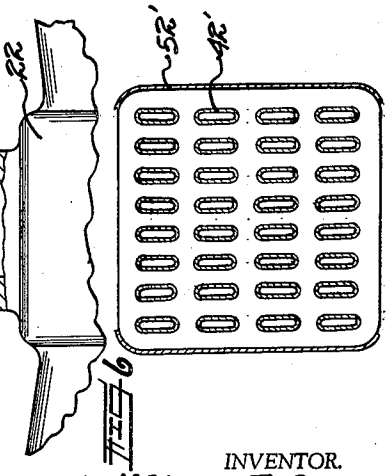


FIG. 6

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FIG. 7.

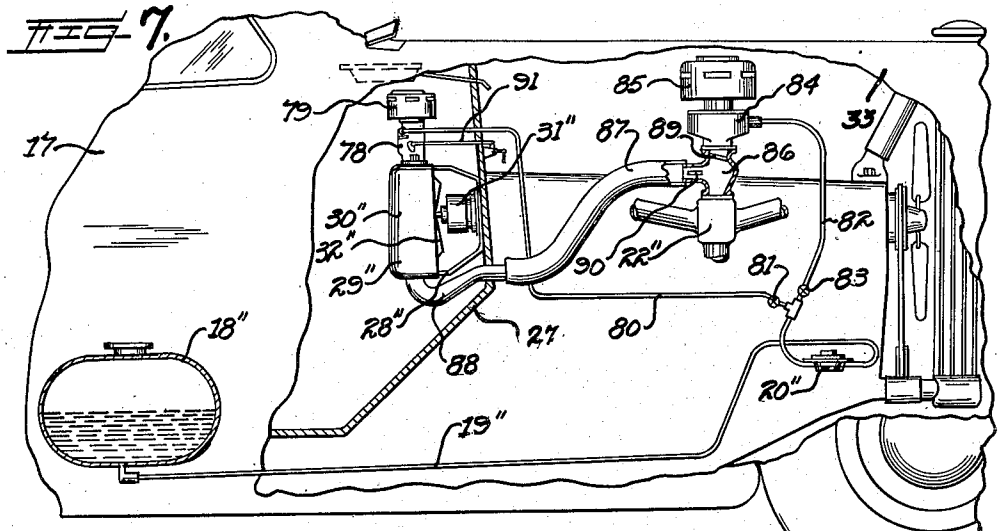


FIG. 8.

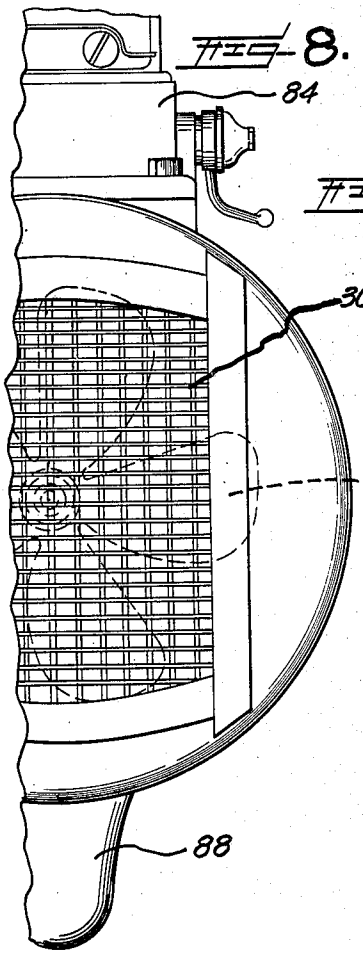
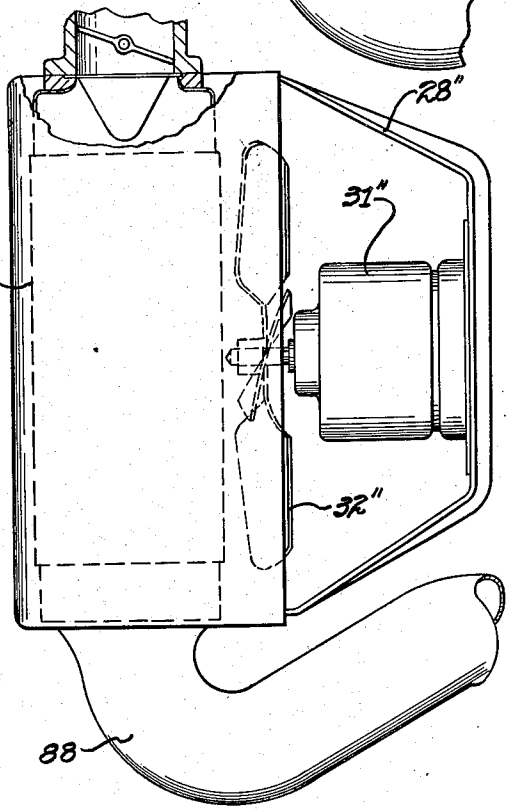


FIG. 9.



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UNITED STATES PATENT OFFICE

2,227,927

COOLING APPARATUS

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Application May 24, 1938, Serial No. 209,774

4 Claims. (Cl. 62—169)

My invention relates to a new and useful improvement in a cooling apparatus and particularly one adapted for use in connection with a vehicle whereby a current of air may be cooled and directed inwardly of the vehicle for the purpose of maintaining cooled atmosphere therein.

It is an object of the invention to provide in an apparatus of this type a container adapted for the reception of a vaporizable liquid and an apparatus for vaporizing the liquid for cooling the same and a vaporizing mechanism for condensing the vapor of the liquid.

It is another object of the present invention to provide in a cooler of this class a receptacle through which vaporized liquid may be delivered and in which a vaporizable fluid may be rarefied for the purpose of condensing the vapor delivered therethrough.

It is another object of the invention to provide in an apparatus of this type of means for delivering a jet of liquid in atomized form into a container in which a fluid is rarefied for the purposes of humidifying the fluid and assisting in the lowering of the temperature of the fluid being rarefied.

Another object of the invention is the provision in a cooling mechanism of this class of a vaporizing mechanism for vaporizing a vaporizable liquid and a condensing mechanism for condensing the condensed vapor together with a receptacle for reception of the condensate.

Another object of the invention is the provision in a cooling apparatus of a mechanism whereby a combustible fluid together with a mixture of air to be subjected to a rarefication for the purposes of lowering the temperature of the same and then deliver to the intake manifold of an internal combustion engine.

Another object of the invention is the provision in combination with an intake manifold of an internal combustion of a pair of carburetors so arranged and constructed so that said carburetors may be alternately connected to the source of fuel supply.

Other objects will appear hereinafter.

The invention consists in the combination and arrangement of parts hereinafter described and claimed.

The invention will be best understood by a reference to the accompanying drawings which form a part of this specification, and in which,

Fig. 1 is a side elevational view of one form of the invention.

Fig. 2 is a side elevational view of another form of the invention.

Fig. 3 is a sectional view through the condensing chamber of the form shown in Fig. 1.

Fig. 4 is a central sectional view through the condensing chamber of the form shown in Fig. 2.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4.

Fig. 7 is a side elevational view of a further modified form of the invention showing parts broken away and parts shown in section.

Fig. 8 is a fragmentary front view of the container used in the invention in the form shown in Fig. 7.

Fig. 9 is a fragmentary, side elevational view of the container used in the form shown in Fig. 7.

Fig. 10 is a plan view of the chamber 36 of Fig. 1.

In Fig. 1 I have illustrated the invention applied to a vehicle having a body 17, a fuel tank 18, a fuel delivery line 19 and a fuel pump 20 for delivering fuel to the carburetor 21 which is adapted to communicate with the intake manifold 22 leading to the internal combustion engine 23 which is of the water jacket type and provided with a water radiator 24 communicating with the water jacket of the engine by means of the conduits 25 and 26. Mounted on the dash 27 of the vehicle body is a bracket 28 which serves as a support for a frame 29 in which is mounted a container 30 constructed similar to the ordinary water radiator of an automobile of either the honeycomb or the fin and tube type so that air may be blown through the air passages in the container. An electric motor 31 is supported on the bracket for driving the fan 32 to force air through the air passages. The engine is enclosed by a hood 33 and a conduit 34 extends exterior of the hood 33 and carries an air filter 35 positioned in the interior of the body 17 through which air may enter for delivery to the carburetor 21. This air filter 35 may be positioned outside of the body of the car if desired but in all events it should be positioned outside of the hood 33. Interposed between this carburetor 21 and the intake manifold 22 is a chamber 36 which is in communication with both so that combustible fluid passing from the carburetor 21 to the intake manifold 22 is forced to pass through the chamber 36. A conduit 37 serves to connect the container 30 at its lower end through the valve 38 with the water circulating system of the engine 23 adjacent its

upper side. A conduit 39 communicates with the upper side of the container 30 and connects to a vacuum pump 40 which is connected by the pipe 41 to the fin and tube type core 42 positioned within the chamber 36 (see Fig. 3) and having passages formed therethrough through which the mixture may pass from the carburetor to the intake manifold 22. This connection is made at one end of the core 42 and the opposite end is in communication with the conduit 43 which connects through the valve 44 with the fitting 25 so as to establish communication of the core 42 with the vehicle radiator 24.

The core 42 also communicates with a branch pipe 45 which communicates with the receptacle 46 above the bottom thereof. The lower part of this receptacle 46 communicates by the pipe 47 with a float chamber 48 in which is positioned a suitably operated float valve to control the flow of liquid through the pipe 47 into the float chamber 48. This float chamber 48 communicates with the pipe 37 and thereby with the container 30 at its bottom. The float chamber also communicates with the top of the container 30 by means of the pipe 49. The receptacle 46 communicates at its upper end through the pipe 50 with a tube 51 supported by the frame 52 which embraces the core 42. The opposite end of the tube 51 communicates through the pipe 53 with an air bleed pipe 54 which serves to bleed air into the container 30 adjacent the bottom thereof.

Communicating with the chamber 36 is a fitting 55 connected by the pipe 56 to a container 57 in which water is deposited. The chamber 57 is provided with an air valve 58 at one end so that the water in the receptacle 57 may be placed under pressure and forced through the nozzle 59 in an atomized spray adjacent the whirling disk 60 which is projected into the chamber 36 and positioned in the path of the enclosing mixture. This conical member 60 is utilized merely for giving a whirling motion to the enclosing mixture for the purpose of effecting a thorough mixing of the same. The spray of water serves to assist this mixing and serves also to assist the lowering of the temperature of the enclosing fluid when it enters the chamber 36. This chamber 36 is maintained by the suction of the engine under a partial vacuum so that the enclosing mixture is rarefied with the result that the temperature is considerably lowered.

When it is desired to use the mechanism as a cooler, the valves 38 and 44 would be closed and the pump 40 would be operated. A sufficient amount of vaporizable liquid such as water or a more highly volatile liquid such as alcohol, gasoline, or the like would be deposited in the container 30 and the receptacle 46 to partially fill the container 30 to that level at which the valve controlled by the float mechanism would be closed. As the pump 40 would be set into operation, the space in the container 30 above the liquid therein would be reduced to a partial vacuum and the vapor would be transmitted through the pipe 41 into the core 42. The rarefied fuel mixture in the chamber 36 passing through the passages of the core 42 would effect a cooling of this vapor and result in a condensing of the same. The condensate would flow through the pipe 45 into the receptacle 46 from which it would be drawn through the pipe 47 and the float chamber 48 back to the container 30. As the liquid in the container 30 would be rarefied upon establishing a partial vacuum in the container 30, air would bleed through the pipe 54 and pass upwardly through the liquid in the container 30 and outwardly through the pipe 39 in unison with the vapors passing therethrough. This would effect a lowering of the temperature of the liquid in the container 30 so that the air driven through the air passages of the container 30 would be lowered in temperature and thus a means would be provided for maintaining a lowered temperature in the interior of the vehicle body 17. The air passing through the pipe 39 and 41 into the core 42 would, of course, pass into the receptacle 46 together with the condensate flowing through the pipe 45. This air would be drawn from the receptacle 46 through the pipe 50 and the tube 51 and returned by the pipe 53 to the air inlet pipe 54 after the same had been cooled in the tube 51.

Thus, I have proivded a cooling mechanism whereby a vaporizable liquid is subjected to a partial vacuum for the purposes of rarefying the same in order to lower the temperature thereof and which is used for cooling the air blown against or in the proximity of the container in which the liquid is positioned. It will also be noted that the liquid used for cooling purposes is recirculated and that I have utilized the rarefied fuel mixture for cooling the vapor and condensing it so that it may be returned to the liquid container in liquid form.

When it is desired to use the mechanism as a heater, the valves 38 and 44 would be opened so that the container 30 would be filled with the hot water which is used for cooling the engine 23. The pump 40 under such circumstances may be operated or not as desired, and when it is operated the hot water will be circulated through the core 42 so that the core 42 would serve as a preheater for the combustible mixture passing through the chamber 36. Under such circumstances, the valve 61 controlling the entry of air through the bleed pipe 54 would, of course, be closed.

It will be noted that the air being mixed with the combustible fluid is taken from a point exterior of the engine hood 33 so that the hot air which is ordinarily present under the engine hood is not permitted to enter or pass through the chamber 36. I have indicated the cowl 61 of the engine provided with an opening 62 through which fresh air may enter the interior of the body 17, a drip pan 63 being positioned below the opening 62 for the purpose of catching rain or other water which may pass through the opening 62.

In the form shown in Fig. 2 a slightly different arrangement is provided. The float chamber is eliminated as is likewise the tube 51. Positioned in the receptacle 36' which is positioned between the carburetor 21' and the intake manifold 22' is a core 42' enclosed by the casing 52'. This core is provided at its ends with the chambers 65 and 66, the chamber 66 communicating with the conduit 67 and the chamber 65 communicating with the conduit 68. This conduit 68 communicates through the valve 69 with the connection 25 so as to establish communication of the core 42' with the radiator of the vehicle. The conduit 68 communicates with the conduit 70 in which is positioned a pump 71 communicating through the pipe 72 with the lower portion of a container similar to the container 30 which is mounted in the casing 29' supported by a bracket 28' mounted on the dash 27 of the vehicle. An electric motor 31' serves to operate the fan 32' to force

a current of air through the container in the housing 29, this container being of the honeycomb type or the fin and tube type.

The conduit 67 communicates with the container in the shell or housing 29' adjacent the top of the container. A conduit 72 communicates through the conduit 73 and the valve 74 with the water jacket of the engine 23. The conduit 34' communicates with the air filter 35' to conduct air therefrom into the carburetor 21'.

A receptacle 57' is provided in which water or the like is positioned and this receptacle communicates through the conduit 56' in which is positioned a valve 75 with an atomizing nozzle 59' connected to the fitting 55' so that atomized water vapor may be delivered into the interior of the chamber 36'.

When the device is used for cooling purposes, the valve 76 in the pipe 72 is open and the valves 68 and 74 are closed. The pump 71 then circulates liquid through the pipes 72 and 67, through the core 42' and the pipe 70. The water passing through the core 42' is cooled by the rarefied fuel mixture delivered into the chamber 36' and the air delivered through the air passages of the container 30' supported by the shell 29' will be cooled by the cooled liquid within the container 30'.

When the device is used as a heater, the valve 74 would be opened as would likewise the valve 69 while the valve 76 would be closed. Under such circumstances, the hot water circulating through the container 30' would serve as a hot water heater in the usual manner as well as serving as a preheater in the core 42' for preheating the combustible mixture delivered to the engine.

In Fig. 7 I have shown a modified form of the invention in which a container 30'' of the honeycomb or fin and tube type is supported in a casing 29'' mounted on the bracket 28'' supported on the dash 27 of the vehicle. Positioned above and in communication with the container 30'' is a carburetor 78 positioned above which is the air cleaner 79 for receiving air from the interior of the vehicle body 17. A pipe 19'' serves to conduct combustible fluid from the tank 18'' to the fuel pump 20'' which serves to deliver it through the pipe 80 in which is interposed the manually operable valve 81 to the fuel of the carburetor 78. The pump also communicates with the pipe 82 in which is interposed the manually operable valve 83, the pipe 82 serving to conduct fuel to the carburetor 84 above which is positioned the air cleaner 85. The carburetor 84 communicates with the fitting 86 which is mounted in communication with the intake manifold 22''. Communcating with this fitting 86 is a conduit 87 which communicates with the pipe 88 projecting outwardly from the bottom of the container 30''. The construction is such that when the valve 83 is closed and the valve 81 opened, the carburetor 78 will be used for mixing the fuel. The fuel mixture passing from the carburetor 78 will pass into the container 30'' and thence through the pipe 88 and the conduit 87 to the fitting 86. When the carburetor 78 is being used the butterfly valve 89 will be closed and the butterfly valve 90 will be opened. The motor 31'' serves to drive the fan 32'' so that when the carburetor 78 is being used air driven through the air passages of the container 30'' will be cooled. In normal operation, the carburetor 78 would be used when it is desired to deliver cooled air into the body 17 of the vehicle so that for summer driving the carburetor 78 would be used. In the winter time when cooled air is not desired, the valve 81 would be closed and the valve 83 opened and the valve 89 would be opened and the valve 90 closed thus using the carburetor 84 for carburetion purposes.

The throttle valve of the carburetor 78 would be operated in the usual manner by the accelerator pedal and the cable 91 would serve as a means for making the necessary connection to the accelerator pedal.

In this way I have provided a pair of carburetors one of which may be used for cooling purposes and the other of which may be used in the ordinary manner when desired.

It is believed obvious that, if desired, the liquid used for fuel purposes deposited in either one of the fuel tanks may consist of gasolene, alcohol, or any suitable volatile material. If desired, the mixture may consist of alcohol and gasolene and particularly is this desirable when the form shown in Fig. 1 is used.

While I have illustrated and described the preferred form of construction, I do not wish to limit myself to the precise details of structure shown but desire to avail myself of such variations and modifications as may come within the scope of the appended claims.

What I claim as new is:

1. In combination with a vehicle having an internal combustion engine for propelling the same, an intake manifold and a carburetor enclosed by a hood: a reservoir for reception of vaporizable fluid; a chamber positioned between and in communication with said carburetor and said intake manifold; a core mounted in said chamber; means for connecting one end of said core to said reservoir; means for maintaining a partial vacuum in said reservoir and delivering fuel vapors therefrom to one end of said core; means for connecting the opposite end of said core in communication with said reservoir for delivering condensate from said core to said reservoir; and means for delivering a current of air into proximity with said reservoir for cooling said current of air.

2. In combination with a vehicle having an internal combustion engine for propelling the same, an intake manifold and a carburetor enclosed by a hood: a reservoir for reception of vaporizable fluid; a chamber positioned between and in communication with said carburetor and said intake manifold; a core mounted in said chamber; means for connecting one end of said core to said reservoir; means for maintaining a partial vacuum in said reservoir and delivering fuel vapors therefrom to one end of said core; means for connecting the opposite end of said core in communication with said reservoir for delivering condensate from said core to said reservoir; means for delivering a current of air into proximity with said reservoir for cooling said current of air; and means for injecting an atomized stream of water into said chamber.

3. In combination with a vehicle having an internal combustion engine for propelling the same, a carburetor, an intake manifold and a hood for enclosing the same: a chamber positioned between and in communication with said intake manifold and said carburetor; a core positioned in said chamber; a reservoir for the reception of a vaporizable fluid; means for connecting one end of said core with said reservoir; means for connecting the opposite end of said core with said reservoir; and means for maintaining a partial

vacuum in said reservoir and effecting a circulation of fluid from said reservoir through said connecting means.

4. In combination with a vehicle having an internal combustion engine for propelling the same, a carburetor, an intake manifold and a hood for enclosing the same: a chamber positioned between and in communication with said intake manifold and said carburetor; a core positioned in said chamber; a reservoir for the reception of a vaporizable fluid; means for connecting one end of said core with said reservoir; means for connecting the opposite end of said core with said reservoir; means for maintaining a partial vacuum in said reservoir and effecting a circulation of fluid from said reservoir through said connecting means; and means for injecting a jet of liquid into said chamber.

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