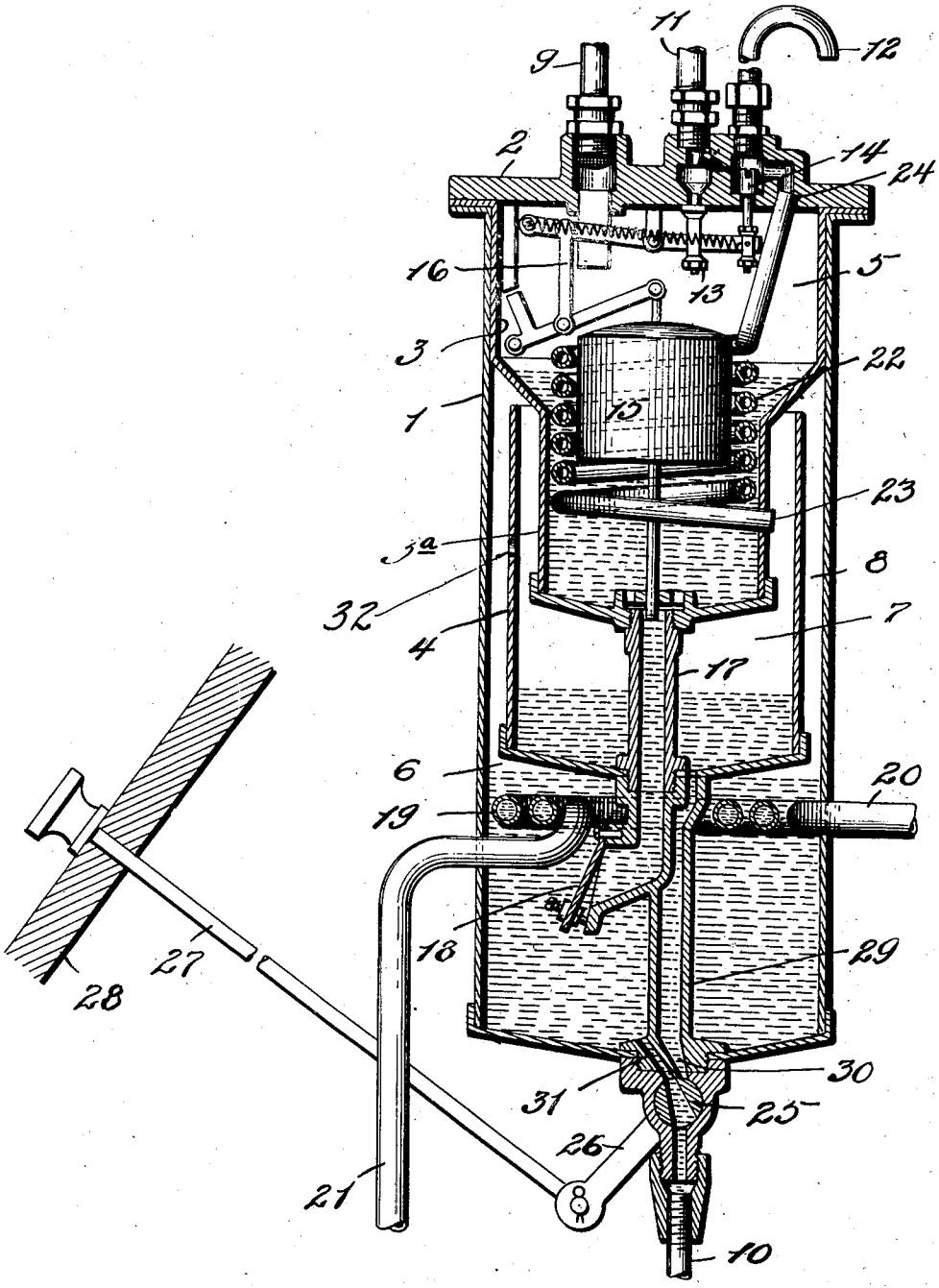
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HYDROCARBON SUPPLY APPARATUS FOR INTERNAL COMBUSTION ENGINES

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HYDROCARBON-SUPPLY APPARATUS FOR INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, VALENTINE C. KLOEPPER, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Hydrocarbon-Supply Apparatus for Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates generally to engines and, more particularly, to a certain new and useful improvement in hydro-carbon supply apparatus for engines especially of the internal combustion type.

It is the common practice today in automotive construction to connect the carburetor directly with a gasoline supply tank and conduct from the carburetor a like quality of gasoline to the cylinders of the engine for both starting and running. Owing, however, to the now high, and gradually rising, flash-point of present-day gasoline, resulting from excessive consumption of gasoline and other causes with which we are not here concerned, more or less difficulty is experienced with most automobiles in effecting volatilization and explosions in starting.

The principal object of my present invention is briefly to obviate such difficulty in starting resulting from the present day use of gasoline of high flash-point and relatively high specific gravity and, to that end, to provide a supply apparatus, forming part of the gasoline system of, and operating with, the automobile, adapted to vaporize and re-distill a suitable portion or quantity of the normal "running" supply to a lower flash-point and lower specific gravity than that of the normal supply and to store and make readily available for facilitating starting such refined and correspondingly more volatile quantity or portion of the normal "running" supply.

With the above and other objects in view, my present invention resides in the novel features of form, construction, arrangement, and combination of parts hereinafter described and afterwards pointed out in the claims.

Referring now more in detail to the accompanying drawing, which illustrates in vertical sectional elevation an engine hydrocarbon supply apparatus embodying my invention, 1 indicates a suitable tank preferably topped by a closure cap 2 and divided interiorly by shells 3 and 4, suitably fixed in relative positions, preferably as shown, into an upper or float-chamber 5, a lower-chamber 6, and an intermediate chamber 7. Upper shell 3 is preferably reduced in diameter, as at 3^a, relatively to the diameter of tank 1 and of lower shell 4 and throughout substantially its reduced portion 3^a is surrounded by, but spaced from, lower shell 4, the latter being preferably open at its top and also spaced from the wall of tank 1 to form or provide a communicating passage, as at 8, from and between lower chamber 6 and intermediate chamber 7. The tank 1 in use, is suitably positioned upon the car and in the gasoline system is located intermediate the main gasoline tank (not shown) and the carburetor (also not shown), a supply-pipe 9 leading from the main gasoline tank and through cap 2 into upper chamber 5 of tank 1 and a delivery-pipe 10 leading from or adjacent the bottom of tank 1 to the carburetor.

The tank 1 here shown is of the well-known vacuum supply type and to such end includes an air or vacuum pipe 11 providing communication through cap 2 between upper tank-chamber 5 and the intake-manifold of the engine (not shown), a second pipe or vent 12 leading from the upper tank-chamber 5 to atmosphere, a suction-valve 13 for opening and closing the pipe-connection 11 to the engine manifold and through which a vacuum is extended from the engine-manifold to the upper tank-chamber 5, an atmosphere valve 14 for permitting and preventing an atmospheric condition in upper tank-chamber 5, a float 15 mounted for movement in upper tank-chamber 5, and float-operated connected levers 16 for actuating the valves 13 and 14. Extending

vertically through the intermediate chamber 7 and leading from upper chamber 5 into lower chamber 6, is a discharge-pipe 17, provided at its outlet end and within lower chamber 6 with a flapper-valve 18.

In operation, it may be here stated, and as is well known, the tank 1, when the engine is running, operates normally to maintain a uniform uninterrupted flow or supply of gasoline to the carburetor. Valve 13 being open, a suction and vacuum are created in upper tank-chamber 5, under which the valve 18 will be closed and gasoline will be sucked through pipe 9 into the upper tank-chamber 5. As the chamber 5 fills, the float 15 will move upwardly and, through the levers 16, valve 13 will be closed and valve 14 opened, whereupon valve 18 will also open and the contents of upper chamber 5 discharge through outlet 17 into lower chamber 6 for normally supplying the carburetor, as hereinafter more fully appears. As float 15 falls in chamber 5 with the emptying of its contents, valve 13 will again be opened, valves 14 and 18 again closed, and chamber 5 filled under the vacuum and suction so provided, and so on during the running of the engine, the upper chamber 5 being alternately filled from the main gasoline supply and alternately emptying or discharging into the lower or normal discharge chamber 6 of the tank and thus maintaining a substantially uniform and uninterrupted feed for the carburetor.

Suitably fixed within lower chamber 6 on a plane slightly beneath the normal fluid or gasoline level, as shown, is a vaporization heater preferably in the form of a tubular coil 19, its inlet-end 20 being arranged for connection with the engine exhaust or other source of heat supply and its outlet end 21 leading to ground or to the suction side of water pump when cooling water is used.

Suitably fixed within the float or upper tank-chamber 5 and preferably surrounding the float 15, is a tubular worm forming a condenser-coil 22 having its one end 23 open to the passage 8 and its other end 24 open to atmosphere through the pipe 12, as shown.

Located between the pipe 10 leading to the carburetor and the tank 1, is a valve 25 preferably of the rotary type shown, which is provided with an actuating lever 26 to which is connected an operating rod 27 leading to a convenient accessible point, such as the instrument board 28, of the car, and extended between and adapted for communication with the valve and the cup or shell 4 is a pipe-connection 29 having two ports 31 and 30 communicating, respectively, with the lower tank-chamber 6 and the intermediate tank-chamber 7.

The engine running, and upon the application of heat by means of the coil or heater 19 to the body of gasoline in the lower tank-chamber 6, certain vaporization and re-distillation of such gasoline is created and set up. The gasoline vapors so produced will flow or be conducted upwardly through passage 8 and into intermediate chamber 7, where such vapors largely condense and are collected and remain separately stored for use, as will shortly appear. Any surplus or non-condensing vapors so created pass upwardly through and are conducted to atmosphere by the worm 22, which coil or worm also, as will be evident, normally admits an atmospheric condition in the lower and intermediate tank-chambers, permitting the desired even and uninterrupted flow of the gasoline from the tank to the carburetor, any hydro-carbon vapor condensing in the worm or coil 22 flowing back and also being collected and stored for use in the chamber 7.

The gasoline so distilled from lower tank-chamber 6 and condensed and stored in intermediate chamber 7 is more refined, of greater volatility, and of a lower flash-point than the normal "running" supply of gasoline flowing from upper chamber 5 into lower chamber 6 and is hence more readily and quickly volatilized and exploded in the engine cylinders, and this refined or redistilled gasoline is thus particularly useful in facilitating the starting of the car. Accordingly, the operator of the car, when starting, will so selectively actuate rod 27 to bring valve 25 into registration with port 30, when the refined gasoline stored in chamber 7 will flow or discharge through outlet 10 to the carburetor. After the car has started, the operator may actuate the rod 27 to now bring valve 25 into registration with port 31 and out of registration with port 30, when the normal gasoline contained in chamber 6 will discharge to the carburetor, as is now common in vacuum gasoline supply systems, with this difference, however, that such normal gasoline has been to a certain extent heated by the heat of coil 19 and its volatility and explosibility correspondingly increased and quickened.

My new apparatus is compact and simple in form and construction, is automatic and positive in operation, and is most efficient in accomplishing its described object and function. It will be noted that the wall of shell 4 is provided with an orifice or aperture, as at 32, below the plane of coil-inlet 23, to permit any excessive quantity of refined hydro-carbon to flow back into main or lower supply chamber 6 without closing or in otherwise affecting coil 22; and it is to be understood that various changes in the form, construction, arrangement, and combination of the several parts of the apparatus may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus comprising a hydrocarbon containing tank, means for refining and storing some of the hydrocarbon of the tank, said means including a vaporizing coil having communication with the exhaust of the engine and disposed in intimate relation with hydrocarbon in the tank, and a shell having communication with the tank for receiving condensing vapors from the tank, a common outlet-pipe from the shell and tank for hydrocarbon supply communication with the engine, and means for controlling hydrocarbon supply communication selectively through said pipe between the tank or shell and the engine.

2. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus comprising a tank having a hydrocarbon containing chamber adapted for hydrocarbon supply communication with the engine, a heating coil having communication with the engine-exhaust and disposed in the tank for vaporizing some of the hydrocarbon of said chamber, a second chamber within the tank also adapted for hydrocarbon supply communication with the engine and having communication with the first chamber for receiving condensing vapors therefrom, and means for controlling hydrocarbon supply communication selectively between the tank or shell and the engine.

3. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus including a tank having a hydrocarbon containing chamber, a heating coil having communication with the engine-exhaust and disposed in the tank for vaporizing some of the hydrocarbon of said chamber, a second chamber within the tank having communication with the first chamber for receiving condensing hydrocarbon vapors from the first chamber, a common hydrocarbon supply passage between said chambers and the engine, and means for controlling hydrocarbon supply through said passage selectively from said chambers to the engine.

4. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus including a tank divided into an upper chamber, an intermediate chamber, and a lower chamber, the upper chamber being adapted to supply hydrocarbon to the lower chamber, a heating coil disposed in the lower chamber and having communication with the engine-exhaust for vaporizing some of the hydrocarbon of the lower chamber, the intermediate chamber having communication with the lower chamber for receiving condensing hydrocarbon vapors therefrom, a common hydrocarbon supply passage between the intermediate and lower chambers and the engine, and means for controlling hydrocarbon supply through said passage selectively from the intermediate and lower chambers to the engine.

5. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus including a tank divided into an upper chamber, an intermediate chamber, and a lower chamber, the upper chamber being adapted to supply hydrocarbon to the lower chamber, a heating coil disposed in the lower chamber and having communication with the engine-exhaust for vaporizing some of the hydrocarbon of the lower chamber, the intermediate chamber having communication with the lower chamber for receiving condensing hydrocarbon vapors therefrom, a common hydrocarbon supply passage between the intermediate and lower chambers and the engine, means for controlling hydrocarbon supply through said passage selectively from the intermediate and lower chambers to the engine, and means for conducting surplus hydrocarbon vapors from the intermediate chamber to atmosphere.

6. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus including a tank divided into an upper chamber, an intermediate chamber, and a lower chamber, the upper chamber being adapted to supply hydrocarbon to the lower chamber, a heating coil disposed in the lower chamber and having communication with the engine-exhaust for vaporizing some of the hydrocarbon of the lower chamber, the intermediate chamber having communication with the lower chamber for receiving condensing hydrocarbon vapors therefrom, a common hydrocarbon supply passage between the intermediate and lower chambers and the engine, means for controlling hydrocarbon supply through said passage selectively from the intermediate and lower chambers to the engine, and a coil located within the upper chamber and having communication with the intermediate chamber and atmosphere for conducting surplus hydrocarbon vapors from the intermediate chamber to atmosphere.

7. In combination with an engine of internal combustion type, a hydrocarbon supply apparatus including a tank divided into an upper chamber, an intermediate chamber, and a lower chamber, the upper chamber being adapted to supply hydrocarbon to the lower chamber, a heating coil disposed in the lower chamber and having communication with the engine-exhaust for vaporizing some of the hydrocarbon of the lower chamber, the intermediate chamber having communication with the lower chamber for

receiving condensing hydrocarbon vapors therefrom, a common hydrocarbon supply passage between the intermediate and lower chambers and the engine, a valve located in said passage for controlling hydrocarbon supply through said passage selectively from the intermediate and lower chambers to the engine, and a coil located within the upper chamber and having communication with the intermediate chamber and atmosphere for conducting surplus hydrocarbon vapors from the intermediate chamber to atmosphere.

In witness whereof, I have signed my name to this specification.

VALENTINE C. KLOEPPER.