W. JAY.

COMBINED COOLING AND LIQUID FEED SYSTEM.

APPLICATION FILED APR. 9, 1918.

1,309,985.

Patented July 15, 1919.

Fig. 1.

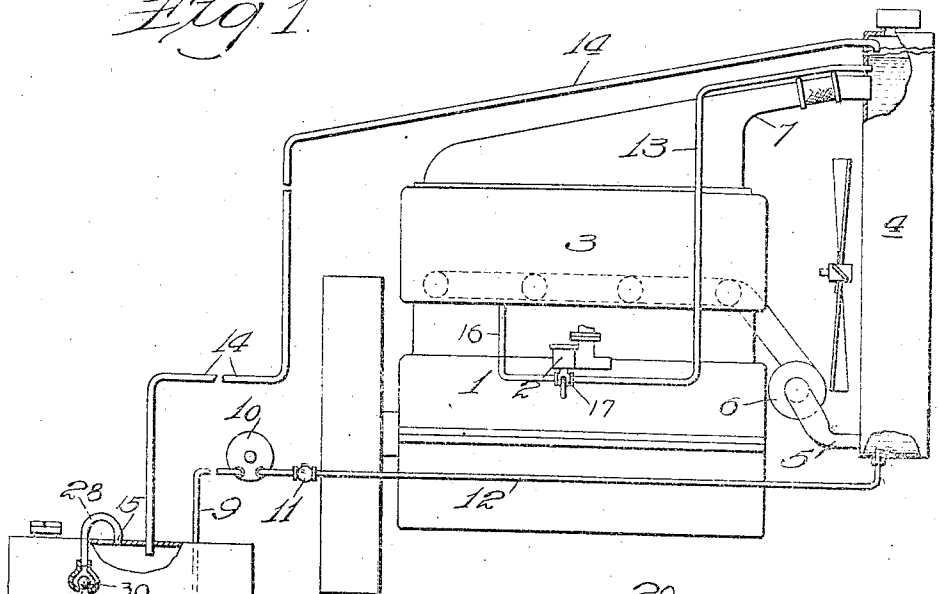
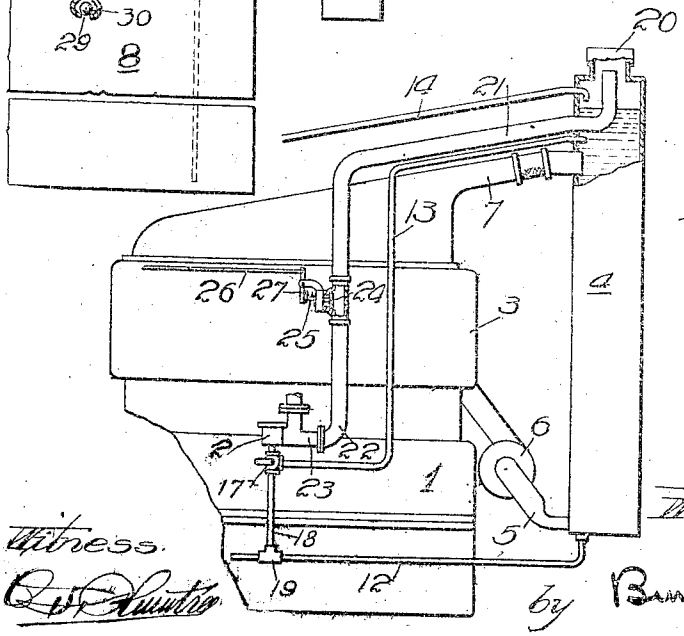


Fig. 2.



Witness.

Inventor:
Webb Jay,

by Burton & Burton
his Attys

UNITED STATES PATENT OFFICE.

WEBB JAY, OF CHICAGO, ILLINOIS.

COMBINED COOLING AND LIQUID-FEED SYSTEM.

1,309,985. Specification of Letters Patent. Patented July 15, 1919.

Application filed April 9, 1918. Serial No. 227,486.

To all whom it may concern:

Be it known that I, WEBB JAY, a citizen of the United States, residing at Chicago, in the county of Cook and the State of Illinois, have invented certain new and useful Improvements in Combined Cooling and Liquid-Feed Systems, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an arrangement for utilizing the same liquid as fuel and as the cooling medium in the circulatory system of an internal combustion engine. It consists in the combination and relation of parts hereinafter described and shown in the drawings as indicated by the claims.

In the drawings:

Figure 1 is a diagrammatic side elevation of an internal combustion engine and a carbureter, a radiator and a fuel supply tank associated therewith together with suitable pipe connections for carrying out this invention.

Fig. 2 is a similar diagram showing in side elevation a portion of an engine with its carbureter and radiator provided with a connection for carrying out this invention in accordance with the modification hereinafter described.

The drawing shows in outline an internal combustion engine, 1, provided with a carbureter, 2, and fitted with the usual jacket, 3, around the combustion chambers of the cylinders arranged to contain a liquid cooling medium the radiator, 4, for the liquid cooling medium is connected at its lower portion with the jacket, 3, by means of a pipe, 5, including a circulating pump, 6, and a second connection leads from the upper part of the jacket, 3, to the upper portion of the radiator, 4, as indicated at 7.

The usual supply tank for the liquid fuel, such as gasolene or kerosene, to be employed in the carbureter, 2, is shown at 8, provided with a feed pipe, 9, leading from the lower portion of the tank to a feed pump, 10, adapted to pass the liquid fuel by a check valve, 11, through pipe, 12, into the lower portion of the radiator, 4. From the upper portion of said radiator, 4, a feed pipe, 13, leads directly to the fuel inlet of the carbureter, 2, so that while the fuel supply is interconnected in a way with the circulatory system, it is not dependent upon the circulation in said system, but will be maintained so long as a sufficient level of liquid is maintained in the radiator, 4, to permit overflow therefrom into the feed pipe, 13, to the carbureter, 2. To insure an adquate supply of fuel at all times, it is preferable that the feed pump, 10, have a capacity considerably in excess of the normal demand of the carbureter, 2, and in fact equal to the maximum expected demand, and to prevent such overcapacity and resulting over-supply of fuel through the pump, 10, from creating pressure in the cooling circulatory system or in the fuel supply pipe, an overflow pipe, 14, is arranged leading into the upper portion of the radiator, 4, just above the highest level at which it is desired to maintain the liquid therein and discharging into the upper porton of the tank, 8, said tank being provided with an atmospheric vent, 15, whereby the overflow pipe, 14, normally serves as a vent pipe for the radiator, 4, thus placing the liquid supply in said radiator under atmospheric pressure and permitting ordinary gravity flow of the liquid fuel therein through the feed pipe, 13, to the carbureter, 2.

It will be evident that this system by passing the liquid fuel through the radiator, 4, from which the excess heat of the engine is dissipated, provides a simple means of preheating the fuel, thus insuring its ready vaporization in the carbureter, 2, which is especially important if kerosene is the fuel employed. It also provides a practically non-freezing cooling medium since both kerosene and gasolene solidify at a much lower temperature than water and do not freeze at any usual winter temperatures such as are experienced in most countries.

It will be seen that, by having the feed pipe, 13, lead from a point in the radiator near the top, it becomes impossible for liquid fuel to be withdrawn therefrom to an extent which would lower the liquid level in the radiator dangerously so as to permit overheating of the engine by reason of inadequate provision for cooling it. In certain

emergencies, however, particularly in cold weather when a less quantity of liquid in the radiator would be adequate for a limited time, and when a motor vehicle might otherwise become stalled by a complete emptying of the supply tank, 8, at a considerable distance from a fuel supply station, it may be safe and desirable to withdraw a greater portion of the liquid from the cooling system for use in the carbureter, 2, and for this purpose a supplemental feed pipe, 16, is provided leading from the jacket, 3, of the engine, 1. A valve, 17, controlling the inlet to the carbureter may be such as to provide access thereto either through the pipe, 13, or through the pipe, 16, as the case may require. A still different arrangement for carbureter feed is shown in Fig. 2, in which a supplemental feed pipe, 18, is connected by a T-fitting, 19, into the feed pipe, 12, leading from pump, 10. A valve, 17×, is provided controlling communication between the pipe, 18, and the carbureter, 2, and also between the pipe, 13, and said carbureter, so that with one setting of said valve the normal supply by the pipe, 13, may be had, but with another position of the valve, 17, the fuel may be pumped simultaneously through the pipe, 12, to the radiator, 4, and also through the branch pipe, 18, to the carbureter, 2. This arrangement would further provide that, in the event of failure of supply in the tank, 8, so that no further liquid was furnished from the pump, 10, the check valve, 11, would retain all liquid which had been pumped past it and the carbureter, 2, would be fed by a back flow from the radiator, 4, until the liquid level in the radiator and carbureter were equalized, thus reducing the level of liquid in the radiator to a dangerous point, perhaps, but serving a temporary emergency which might otherwise completely stall the vehicle.

With the absorption of heat by the liquid fuel used in the cooling system, it will be evident that the liquid in the radiator, 4, will vaporize readily and the space above the liquid in the radiator will be heavily impregnated with the gaseous form of said fuel. This may be taken advantage of by leading a feed pipe, 21, from the cap or dome, 20, at the top of said radiator down to a connection, 22, with the air intake, 23, of the carbureter, 2, so as to supply this gas-impregnated air directly to the carbureter. To prevent the suction acting at the air intake, 23, from unduly reducing this pressure in the cap or dome, 20, of the radiator, and thus altering the liquid level therein, an air relief valve, 24, controlled by a relatively light spring, 25, may be provided in the conduit consisting of the pipe, 21, and the connection, 22, so that excessive suction of the engine will be satisfied by additional air supplied through this inwardly opening valve, 24, instead of by undue reduction in the pressure in the top of the radiator. If desired a manual control for the valve, 24, may be provided in the form of a pull rod, 26, acting through lever, 27, for opening the valve at will to furnish such additional air to the carbureter through the intake, 23.

As previously indicated, atmospheric pressure is maintained in the upper portion of the radiator through the overflow pipe, 14, leading from the tank, 8, which has an atmospheric vent, 15. To exclude dirt from the tank, which might otherwise enter at such vent, 15, and also to prevent the liquid from splashing out of the tank to said vent upon violent vibration of the vehicle, the vent may be fitted with a pipe or tube, 28, terminating in a downwardly opening port, 29, controlled by a very light check valve, 30, which will be readily raised off its seat to admit atmospheric pressure upon any slight reduction of pressure in the tank, 8, but which will be seated by any outward flow of liquid through the pipe, 28.

I claim:

1. In combination with an internal combustion engine having a carbureter and a circulatory cooling system comprising a jacket inclosing the explosion chamber of the engine, and a radiator in said circulatory system, a main liquid fuel supply tank at a lower level than the carbureter; a conduit by means of which the fuel passes to the radiator before it reaches the cooling jacket, and means for causing flow of the liquid fuel from said main low tank into the radiator to a high level therein, and a conduit from the radiator to the carbureter; whereby the radiator serves as a reservoir for supplying the carbureter with liquid fuel by gravity flow.

2. In a construction such as defined in claim 1, the carbureter comprising a liquid-containing chamber which directly supplies the carbureter, and with which the liquid fuel connection from the circulatory system is made.

3. In a construction such as defined in claim 1, the carbureter comprising a liquid fuel chamber and the liquid fuel being delivered by gravity only from the circulatory system to said carbureter chamber.

4. In a construction such as defined in claim 1, the radiator having an overflow pipe leading back to the main tank.

5. In a construction such as defined in claim 1, the conduit from the main fuel supply tank being connected for discharge in the radiator at a low level therein and the conduit to the carbureter leading from a high level in the radiator.

6. In a construction such as defined in claim 1, the pipe line leading from the carbureter having an in-leading branch which is connected directly with the jacket at a relatively low point therein, and a three-way valve at the junction of such in-leading branch to be set at will for delivery of fuel to the carbureter either from the radiator or from the jacket.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 3rd day of April, 1918.

WEBB JAY.