

July 15, 1924.

R. K. WINNING

1,501,083

LIQUID FEEDING DEVICE

Filed Oct. 22, 1920

2 Sheets-Sheet 1

Fig. 1.

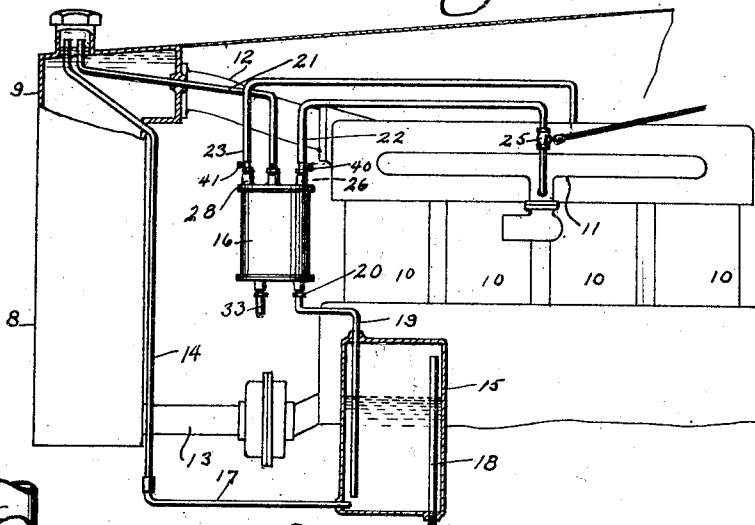


Fig. 2.

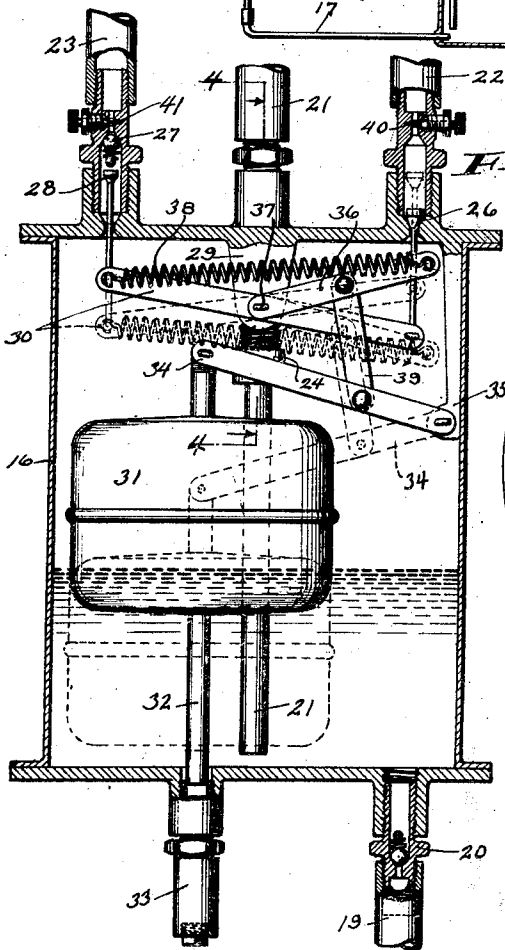
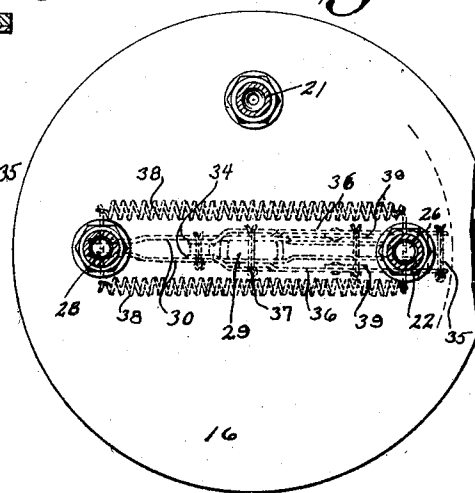


Fig. 3.



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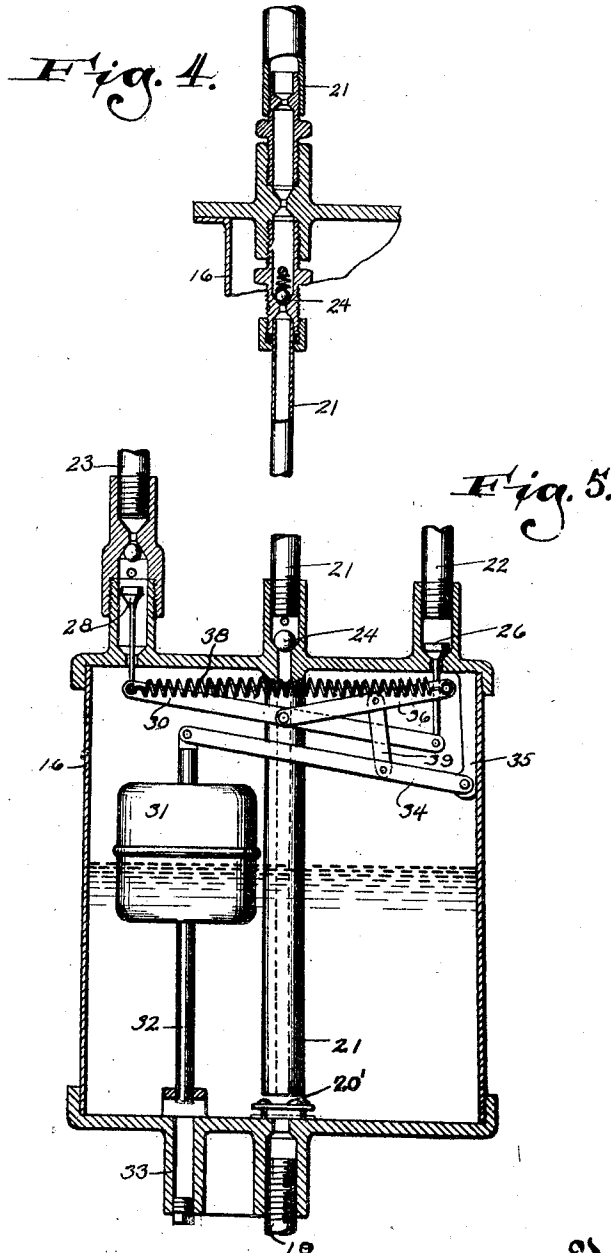
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

ROBERT K. WINNING, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WEEKS MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

LIQUID-FEEDING DEVICE.

Application filed October 22, 1920. Serial No. 418,826.

To all whom it may concern:

Be it known that I, ROBERT K. WINNING, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Liquid-Feeding Devices, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in liquid feeding devices, more particularly adapted for use with internal combustion engine radiators.

It is desirable to maintain the temperature of the walls of internal combustion engines at a predetermined degree to efficiently operate the engine. This is very difficult due to the atmospheric conditions and to a larger extent due to the difficulty in maintaining the proper amount of cooling liquid in the radiator. If too much liquid is poured into the radiator it is apt to boil over when the engine is heated up in running condition, and if too little the engine is apt to overheat.

It is one of the objects of the present invention to overcome the before mentioned objectionable features and provide a liquid feeding device which will automatically maintain a predetermined amount of cooling liquid within the radiator during the entire operation of the engine.

A further object of the invention is to provide a liquid feeding device consisting in part of a supplemental tank or reservoir for receiving the overflow from the radiator and for returning liquid to the radiator when the level of the liquid in the radiator falls below a predetermined point.

A further object of the invention is to provide a liquid feeding device in which a constant circulation of the cooling liquid is maintained between the radiator and the supplemental tank to prevent freezing the liquid in the tank or radiator in cold weather.

A further object of the invention is to provide a liquid feeding device in which both pressure and vacuum means are utilized for returning the cooling liquid from the supplemental tank to the radiator.

A further object of the invention is to provide a liquid feeding device which will

supply moist vapor to the intake manifold of the motor to improve the combustible quality of the motor fuel and to reduce or prevent the formation of carbon in the cylinders of the motor.

A further object of the invention is to provide a liquid feeding device in which the moist vapor supplied to the intake manifold of the engine may be easily controlled from the dash of the car of which the engine forms a part.

A further object of the invention is to provide a liquid feeding device which may be readily attached to radiators of cars now on the market or in use.

A further object of the invention is to provide a liquid feeding device which will be simple, durable and inexpensive in construction, compact in arrangement, easily installed, and effective and efficient in operation.

With the above and other objects in view, the invention consists of the improved liquid feeding device and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a diagrammatical view, partly in section, of a portion of an automobile engine and radiator provided with the improved liquid feeding device;

Fig. 2 is a sectional view of the means for returning cooling liquid to the radiator;

Fig. 3 is a top view thereof;

Fig. 4 is a vertical sectional detail view taken on line 4—4 of Fig. 2; and

Fig. 5 is a vertical sectional view of a modified form of means for returning the water to the radiator.

Referring to the drawings, the numeral 8 indicates the front portion of an automobile which is provided with a radiator 9, and an internal combustion engine 10 having an intake manifold 11. The radiator is connected to the engine water jacket in the ordinary manner by tubes 12 and 13 and is provided with the usual overflow pipe 14 which extends to the upper portion of the radiator. The improved liquid feeding device comprises a supplemental tank or reservoir 15 and an elevating tank 16 both of which are positioned adjacent the

radiator and tank. The supplemental tank 15 has its lower portion connected to the lower end of the overflow pipe 15 by a pipe 17 which forms a continuation of said overflow pipe, and is also provided with a tank overflow pipe 18 which is positioned within the tank and extends from a point near the upper portion thereof to and through the bottom of said tank. A pipe 19 extending through and into the upper portion of the elevating tank 16 and terminating near the bottom portion thereof is connected at its upper end to the lower portion of said elevating tank to draw liquid from the supplemental tank to the elevating tank. A check valve 20 intersects the pipe 19 between the two tanks to prevent return flow of the cooling medium therethrough.

The elevating tank 16 is provided with a return pipe 21, a suction or vacuum pipe 22 and a pressure pipe 23. The return pipe 21 extends from a point within and adjacent the bottom portion of the elevating tank through the top of said tank and into the radiator, and its upper open end terminates in the upper portion of the radiator for returning the cooling medium from the elevating tank to the radiator. Said pipe 21 is intersected by a ball check valve 24 to prevent the downward return flow of said cooling medium.

The vacuum pipe 22 extends from the upper portion of the elevating tank 16 to the intake manifold 11 so that the suction strokes of the engine will produce a partial vacuum in said elevating tank. A valve 25 operable from the dash controls the degree of vacuum created, and another valve 26 located in the upper portion of the elevating tank automatically controls the opening and closing of the opening leading into said elevating tank from the pipe 22.

The pressure pipe 23 is connected to and extends from the upper portion of the elevating tank 16 to the upper portion of one of the cylinders of the engine and is provided with a spring actuated ball check valve 27 which opens outwardly from the cylinder to prevent the suction stroke of the engine from effecting the elevating tank.

A valve 28 located in the upper portion of the elevating tank automatically controls the admission of the pressure medium from the engine cylinder to the said tank.

The upper portion of the elevating tank is provided with a depending lug 29 on which is medially, pivotally connected a pair of levers 30 and to the outer ends of these levers, the stems of the valves 26 and 28 are pivotally connected to alternately open and close said valves.

A float 31 positioned within the elevating tank 16 is mounted fast on a guide rod 32 which extends downwardly and is guided in a guide tube 33 projecting downwardly

from the tank 16. The upper end of the rod 32 is pivotally connected to the outer ends of a pair of levers 34 which are pivoted at their inner ends to a bracket 35 depending from the top portion of the tank 16. A pair of arms 36 positioned on the outer sides of the levers 30 are pivoted at one end to the pivot pin 37 on which the levers 30 are fulcrumed. The outer ends of these arms 36 are connected to the opposite ends of the levers 30 by coiled springs 38, and medial portions of said arms 36 are connected to medial portions of the arms 34 by links 39, so that as the float is moved up and down with the cooling medium, the springs will be swung alternately above and below the fulcrum 37 and alternately open and close the valves 26 and 28 with a quick snappy movement.

The pipes 22 and 23 are provided with needle valves 40 and 41 to control the flow of the power mediums therethrough.

In the modified form shown in Fig. 5 the location of the pipes 19 and 33 and the valves 20' are slightly changed and modified but operate in the same manner as in the preferred form.

In operation the radiator in being filled will overflow and partly fill the supplemental tank and provide a surplus amount of the cooling liquid. The engine in running will heat and thereby expand the liquid and it will further overflow into the supplemental tank. Simultaneously with this action the suction of the intake manifold of the engine will create a partial vacuum in the elevating tank and cause atmospheric pressure to force a portion of the cooling liquid in said supplemental tank through the pipe 19 and into the elevating tank. As the level of the liquid rises in the elevating tank, the float will be moved upwardly and at a predetermined height will swing the springs 38 to a position (as shown) to close the vacuum valve 26 and open the pressure valve 28. This position of the valves will admit the pressure of the explosion stroke of the engine cylinder to which the pipe 23 is connected to enter the elevating tank and force the liquid in said tank through the pipe 21 and into the radiator. As soon as the liquid in the elevating tank has been forced out, the float will drop and reverse the position of the valves and the same operation will be repeated. As the operation is practically continuous, the circulation of the cooling medium from the radiator to the engine and the tanks and back again to the radiator will prevent the medium in the tanks from freezing in cold weather. Furthermore, while the intake manifold is exhausting the air from the elevating tank, moist vapor rising from the warm cooling liquid will be drawn from said tank into the intake manifold and mix with the fuel

vapor of the engine and improve the combustibility of said fuel and thus eliminate the formation of carbon and increase the efficiency of the engine.

5 From the foregoing description, it will be seen that the liquid feeding device is of very simple construction and is well adapted for the purpose described.

What I claim as my invention is:

10 1. In combination with an internal combustion engine having an intake manifold and a radiator provided with an overflow pipe, a supplemental tank connected to said overflow pipe, an elevating tank in communication with supplemental tank, a return pipe connecting the elevating tank to the radiator, a vacuum pipe connecting the elevating tank to the intake manifold, a pressure pipe connecting the elevating tank to one of the cylinders of the engine, and valves controlling the vacuum pipe and the pressure pipe.

2. In combination with an internal combustion engine having an intake manifold and a radiator provided with an overflow pipe, a supplemental tank connected to said overflow pipe, an elevating tank in communication with supplemental tank, a return pipe connecting the elevating tank to the radiator, a vacuum pipe connecting the elevating tank to the intake manifold, a pressure pipe connecting the elevating tank to one of the cylinders of the engine, valves controlling the vacuum pipe and the pressure pipe, and a float means for alternately opening and closing said valves.

3. In combination with an internal combustion engine having an intake manifold and a radiator provided with an overflow pipe, a supplemental tank connected to the overflow pipe, an elevating tank, a valved pipe connecting the lower portion of the elevating tank to the lower portion of the supplemental tank, a valved return pipe connecting the upper portion of the radiator to the lower portion of the elevating tank, a valved vacuum pipe connecting the upper portion of the elevating tank to the intake manifold, a valved pressure pipe connecting the upper portion of the elevating tank to one of the cylinders of the engine, and a float means within the elevator tank for alternately opening and closing the valves in the vacuum and pressure pipes.

35 4. An engine having an intake pipe and a radiator, a supplemental tank, an overflow pipe connecting the radiator to the tank, an elevating tank, a suction pipe connecting the elevating tank to the supplemental tank, a return pipe connecting the elevating tank to the radiator, a suction pipe connecting the engine intake pipe to the elevating tank, a pressure pipe connecting the elevating tank to the engine cylinder, and automatically operated valves for the suc-

tion and pressure pipes for alternately opening and closing said valves.

5. An engine having an intake pipe and a radiator, a supplemental tank, an overflow pipe connecting the radiator to the tank, an elevating tank a suction pipe connecting the elevating tank to the supplemental tank, a return pipe connecting the elevating tank to the radiator, a suction pipe connecting the engine intake pipe to the elevating tank to create a partial vacuum in said tank and to draw moist vapor from the elevating tank to the intake pipe, a pressure pipe connecting the elevating tank to the engine cylinder, and automatically operated valves for the suction and pressure pipes for alternately opening and closing said valves.

6. An engine having an intake manifold and a radiator, a supplemental tank, an elevating tank, an overflow pipe connecting the upper portion of the radiator to the supplemental tank, a valved suction pipe connecting the elevating tank to the supplemental tank, a valved return pipe connecting the elevating tank to the radiator, a suction pipe connecting the intake manifold to the elevating tank to create a partial vacuum therein and to draw moist vapor from the elevating tank to the intake manifold, a pressure pipe connecting the elevating tank to one of the cylinders of the engine to provide pressure in the elevating tank to force a cooling liquid therein through the return pipe and into the radiator, valves controlling the suction pipe and the pressure pipe, and a float mechanism within the elevating tank and connected to the valves of the suction and pressure pipes to alternately open and close said valves to create a vacuum and then form a pressure in said tank.

7. A radiator and engine intake manifold attachment, comprising a supplemental tank for connection with the overflow pipe of the radiator, an elevating tank connected to the supplemental tank for drawing the cooling liquid therefrom, pipes connecting the elevating tank to the radiator and the intake manifold and one of the cylinders of the engine for creating a vacuum and forming a pressure within the elevating tank to withdraw the cooling medium from the supplemental tank into the elevating tank and force said liquid from the elevating tank into the radiator and also to draw moist vapor from the elevating tank to the intake manifold of the engine, valves controlling said pipes, and a float mechanism controlling the operation of said valves.

8. A radiator and engine manifold attachment comprising two tanks having a valved communicating connection, one of said tanks being on a higher plane than the other, pipes connecting said tanks to the radiator, a pipe connecting one of said tanks

to the intake manifold, means connecting the said intake manifold connected tank to a source of pressure, and a float controlled valve for one of the pipes.

- 5 9. A radiator and engine intake manifold attachment, comprising means for receiving the overflow cooling liquid from the radiator, means for elevating said liquid a predetermined height and for drawing the
10 moist vapor rising from said liquid into the intake manifold, and means for forcing the liquid from said predetermined height into the radiator.

- 15 10. A radiator and engine intake manifold attachment comprising two tanks having a communicating connection, pipes connecting both tanks to the radiator, pipes connecting one of said tanks to the intake manifold and to one of the cylinders of the
20 engine, and automatically operated float controlled valves for the pipes connecting the tank to the intake manifold and to one of the cylinders.

- 25 11. A radiator and engine intake manifold attachment comprising means for receiving the overflow cooling liquid from the radiator, vacuum means for elevating said liquid a predetermined height and for drawing the moist vapor rising from said liquid

into the intake manifold, pressure means 30 for forcing the liquid from said predetermined height into the radiator, and a float member controlling the vacuum and pressure means.

12. A radiator and engine intake manifold attachment, comprising two tanks having a communicating connection, pipes connecting both tanks to the radiator, pipes connecting one of said tanks to the intake manifold and to one of the cylinders of the
40 engine, a manually operated valve controlling the pipe connected to the intake manifold, and automatically operated float controlled valves for the pipes connected to the intake manifold and to one of the cylinders. 45

13. A radiator and engine intake manifold attachment, comprising two tanks having a communication connection, pipes connecting both tanks to the radiator, pipes connecting one of said tanks to the intake
50 manifold and to one of the cylinders of the engine, manually operated valves controlling the last mentioned pipes, and automatically operated float controlled valves for the pipes connected to the intake manifold 55 and to one of the cylinders.

In testimony whereof I affix my signature
ROBERT K. WINNING.