July 9, 1946. A. F. CARPENTER 2,403,578

DEVICE FOR PREVENTION OF VAPOR LOCK IN GASOLINE LINES AND THE LIKE

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Fig. 1

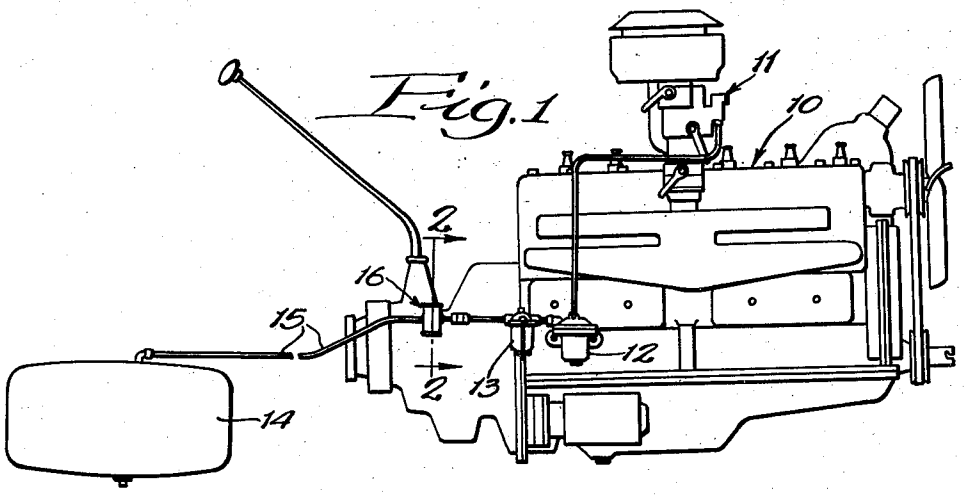


Fig. 2

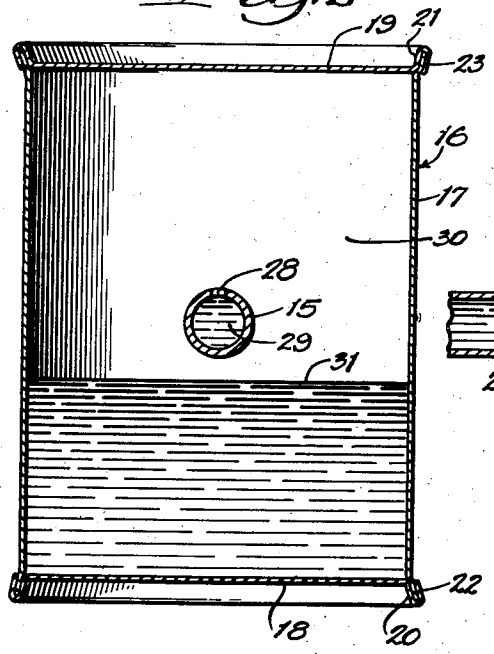
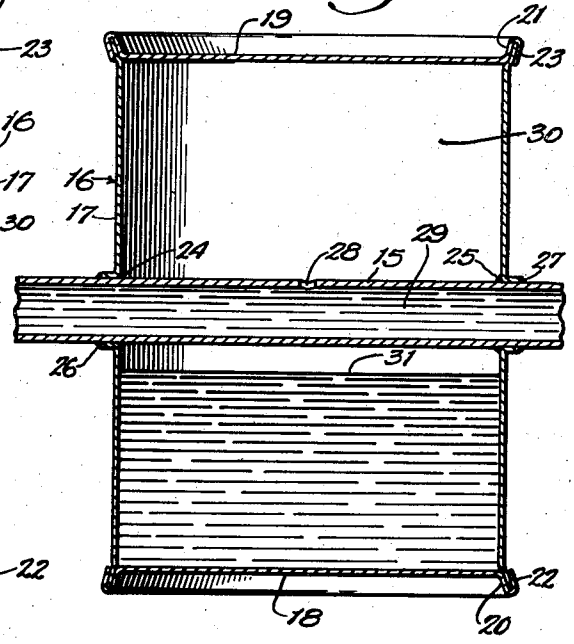


Fig. 3



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DEVICE FOR PREVENTION OF VAPOR LOCK IN GASOLINE LINES AND THE LIKE

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3 Claims. (Cl. 183—2.5)

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This invention relates to a device for the prevention of vapor lock in gasoline lines and the like and more particularly to the removal, from a liquid stream, of bubbles or pockets of vapor which may be formed therein.

An object of the invention is to provide apparatus for removing from a liquid stream any vapor bubbles which may be formed in the liquid, the removal taking place while the liquid is being passed through a conduit. The operation is particularly suitable for removing bubbles or pockets of gasoline vapor from the liquid gasoline as it is being passed through the pump for an internal combustion engine, thus preventing vapor lock in the pump.

Another object of the invention is to provide an expansion chamber about a liquid passage whereby vapors in the liquid stream in the passage may be removed to the chamber. Still another object is to provide a conduit which opens into a chamber and which is so constructed and arranged as to maintain the level of liquid in the chamber below or at the same level with the opening in the conduit. A further object is to provide a closed chamber containing air and being arranged about an opening in the passage so as to receive vapor pockets or bubbles from the liquid stream in the passage.

Other features and advantages of the invention will appear from the following specification and drawing, in which—

Figure 1 is a side elevational view of the apparatus as connected to an internal combustion engine; Fig. 2 is a vertical sectional view taken along the line 2—2 of Fig. 1, showing the expansion chamber about the conduit and Fig. 3 is a longitudinal vertical sectional view of the same chamber.

In the operation of internal combustion engines, the gasoline is ordinarily delivered to the carburetor by a suitable pump which draws the gasoline from the gasoline tank or container and passes it into the carburetor. Under conditions of relatively high atmospheric temperature, the gasoline, while passing through the conduit or line into the pump or carburetor of the engine, tends to vaporize slightly to form innumerable small bubbles or pockets of gasoline vapor within the liquid stream. These small vapor pockets when drawn into the pump interfere with its operation and cause what is known as vapor lock, a condition wherein the vapors in the pump prevent the operation thereof.

The present invention is designed to avoid the difficulties of vapor lock by removing from the

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stream of liquid gasoline in the gasoline line any gasoline vapors which are present therein. Preferably the device is located adjacent the pump so that the operation occurs immediately before the gasoline is introduced into the pump.

In the specific embodiment of the invention illustrated herein, an internal combustion engine 10 is equipped in the usual manner with a carburetor 11, a gasoline pump 12, a filter 13 and a gasoline tank 14. A conduit 15 connects the gasoline tank with the other elements and permits the gasoline to flow from the tank 14 through the filter 13 and pump 12 to the carburetor 11. The conduit 15 may be of any suitable construction and normally consists of copper tubing of an appropriate size.

Adjacent the pump 12 is a chamber 16 which is disposed about the conduit 15. The chamber 16 as seen in Figs. 2 and 3 may be cylindrical in shape and equipped with a cylindrical side wall 17 and end walls 18 and 19. The end walls 18 and 19 are sealed to the ends of the side wall 17 to provide an air-tight container. As shown, the end walls 18 and 19 may be provided with annular flanges 20 and 21 which are turned backwardly upon themselves at 22 and 23 to provide a lip which may be soldered or otherwise sealed to the side wall 17.

The side wall 17 of the casing 16 is provided with openings at 24 and 25 through which extends the conduit 15. The side wall 17 of the casing 16 may be provided with annular flanges 26 and 27 about the openings 24 and 25 and by this means may be sealed in air-tight relation to the outer wall of the conduit 15.

The upper surface of the conduit 15 within the casing 16 is equipped with a small opening 28 which brings the passage 29 formed by the conduit 15 into communication with the chamber 30 formed by the casing 16. The casing 16 is secured to the conduit 15 in airtight relation therewith and with the chamber 30 provided by the casing 16 being at least partially filled with air when the casing is sealed in position. Preferably the casing is arranged about the conduit 15 and sealed in position while the conduit is empty, thus providing a chamber 30 substantially filled with air at atmospheric pressure.

When gasoline is passed through the passage 29 formed by the conduit 15, it may flow through the opening 28 into the chamber 30. However, the pressure of the air within the chamber will prevent the liquid level of the same from rising above the level of the opening 28 in the conduit 15 and, in fact, will normally provide a liquid

level within the chamber substantially below the conduit 15, the level, as shown, being at 31.

The chamber 30 extends upwardly and downwardly from the opening 28 in the conduit 15 and while permitting liquid gasoline to flow from the opening 28 into the lower portion of the chamber at the same time provides an expansion chamber above the opening for receiving gasoline vapors from the opening 28.

In the operation of the device, the casing 16 is sealed about the conduit 15 with the opening 28 providing communication between the passage 29 formed by the conduit 15 and the chamber 30 formed by the casing 16. The casing 16 is sealed about the conduit 15 with the chamber 30 being filled with air under substantially atmospheric pressure. The openings 24 and 25 in the wall 17 of the casing 16 should be so disposed that the opening 28 in the conduit 15 is in the upper half of the chamber 30 and the chamber provides a volume below the opening at least equal to that above the opening.

When the engine 10 is set in operation, the pump 12 causes gasoline to be drawn from the tank 14 through the casing 16. As the gasoline passes through the passage 29 in the conduit 15, a certain amount of the liquid gasoline will flow from the opening 28 into the chamber 30, the quantity of gasoline which passes through the opening 28 depending upon the degree of vacuum established by the pump and the air pressure within the closed chamber 30. As the air pressure is increased in the closed chamber 30 by reason of the decrease in available volume therein because of the introduction of liquid, the pressure of the air on the liquid gasoline at the opening 28 increases until this pressure is equal to the pressure of the gasoline within the conduit and no more liquid will flow through the opening 28. Under ordinary conditions in the operation of the internal combustion engine such as those used in automobiles, the equilibrium pressure between the air in the chamber 30 and the liquid in the passage 29 will be established before the body of liquid in the chamber 30 reaches the level of the opening 28, at least when the volume of the chamber 30 below the opening 28 is at least equal to that above the opening.

The liquid gasoline flowing through the passage 29 may contain innumerable minute bubbles of gasoline vapor. When these bubbles of vapor pass through the opening 28 they are moved upwardly through the opening into the chamber 30 and are thus removed from the stream of liquid gasoline. By reason of the well-known phenomena of partial pressure, the air in the chamber 30 serves to prevent the further flow of liquid through the opening 28 once the equilibrium condition is established but does not prevent the flow of gasoline vapor from the opening 28. Accordingly, the bubbles or pockets of gasoline vapor in the liquid stream are readily removed to the chamber 30.

As the gasoline vapor accumulates in the chamber 30, condensation will occur particularly if the casing 16 is not exposed to excessive heat and the condensed gasoline will flow into the passage 29 through the opening 28 in accordance with the equilibrium conditions established between the liquid gasoline in the passage and the air in the chamber 30.

By providing a construction in which an opening in the upper surface of the conduit 15 is open to the air filled chamber 30, the gasoline vapor bubbles are readily removed through the opening and need not pass substantially out of the line of flow to reach the opening 28.

While there have been shown and described certain embodiments of the invention, it is understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention.

I claim:

1. A device for the prevention of vapor lock in gasoline lines comprising, a conduit providing a passage for the gasoline and being equipped with a single small opening in the upper surface thereof, a casing received about said conduit and sealed thereto, said casing providing a closed chamber containing air and communicating with said opening and extending upwardly and downwardly therefrom, said opening being disposed in the central portion of the chamber whereby at least half of the volume of the chamber is below said opening.

2. A device for the prevention of vapor lock in gasoline lines comprising, a horizontal conduit providing a passage for gasoline and equipped with a single small opening in the upper surface thereof, a closed cylindrical casing extending about said conduit and sealed thereto with the conduit extending through the side wall of the casing and with the opening in the conduit being disposed in the central portion of the casing, whereby at least half of the internal volume of the chamber provided by the casing is disposed below the opening.

3. A device for the prevention of vapor lock in gasoline lines comprising, a horizontal conduit providing a passage for gasoline and equipped with a single small opening in the upper surface thereof, a casing extending about said conduit and sealed thereto providing a closed chamber containing air, said chamber being in communication with said opening and extending upwardly and downwardly therefrom, the opening in said conduit being disposed in the upper half by volume of the chamber whereby the air pressure in the chamber serves to prevent sufficient liquid gasoline from flowing from the opening in the conduit to reach a liquid level in the chamber above the opening in the conduit.

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