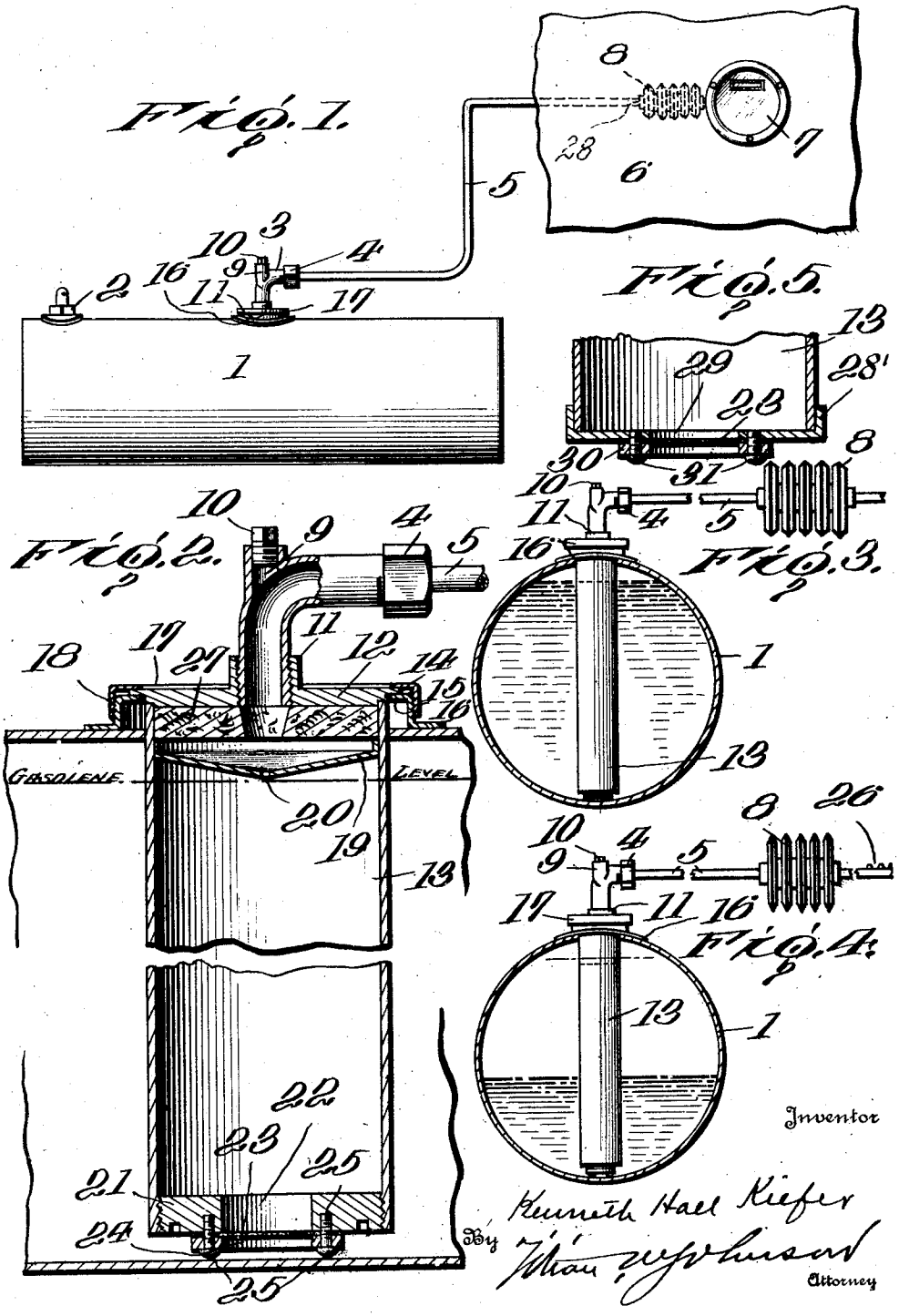
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LIQUID LEVEL GAUGE FOR GASOLINE TANKS

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LIQUID-LEVEL GAUGE FOR GASOLINE TANKS.

Application filed August 26, 1924. Serial No. 734,303.

This invention relates to liquid level gauges, and has special reference to a gauge for use in connection with gasoline tanks of automobiles.

One of the objects of the invention is to improve on the gauge shown and described in my copending application for patent on gasoline gauges, filed August 11, 1923, Serial Number 656,829.

In the gauge described in the aforesaid application, there is employed a pressure tube extending vertically from the top to the bottom of the tank. The tube in question is substantially filled with air and communicates by a capillary tube with an indicator arranged on the dash of the automobile, whereas in the present invention, the tube is virtually or substantially filled with gasoline, which at no time during the operation of the device voluntarily drains from the tube, thus a medium is held in the tube that is not so susceptible to the various changes in temperature, as air, and consequently the possibility of inaccurate readings is reduced to a minimum.

A further object of the invention is to prevent surges due to the movement of the contents of the tank, and in this connection the invention contemplates the provision of the tube with means to steady the level of gasoline in the tube, and prevents it from being surged or splashed into the capillary tube.

The invention further contemplates a novel construction for the bottom of the gasoline tube wherein the gasoline in the tube is guarded against surges due to vibration of the car, and at the same time permits the gasoline to pass from the tank into the tube to fill it to the desired point, while also aiding to some extent in maintaining the column of gasoline in the tube under the vacuum pressure or suction at all times except when the device is operated to let the gas out of the tube.

A still further and important object of the invention is to improve the form and arrangement of the gasoline tube, and the method of operation with this pressure tube is that it will at all times be practically filled with gasoline, and thus the difficulties due to the pressure of a large volume of air will be eliminated, thereby minimizing temperature changes, the method of operation largely controlling this desirable result.

While it has been stated that the invention has certain primary and important objects, I contemplate another object and advantage incident to the construction about to be described, and that is that the gasoline tube within the tank may serve in an emergency as a reserve or emergency gasoline supply.

In the drawings illustrating the invention—

Fig. 1 is a general schematic view of an apparatus for carrying out the invention.

Fig. 2 is an enlarged section of the gasoline tube, capillary tube, and a part of the gasoline tank.

Fig. 3 is a sectional view of a tank showing the tank substantially filled with the gas line near the top, and showing in a diagrammatic way, the position of the units of the bellows diaphragm.

Fig. 4 is a similar view showing the tank partially emptied, with the gasoline line comparatively low therein, and with the units of the bellows diaphragm compressed or contracted, from normal position, the gasoline line in the gasoline tube being shown at substantially the same point as it occupied when the tank was full.

Fig. 5 is a view showing a modified form of a cover or closure for the gasoline tube.

Referring to the drawings, the numeral 1 designates a gasoline tank provided with the usual filling orifice 2. This tank has attached thereto an elbow 3, to which is connected by a union 4, a capillary tube 5 which extends to the dash 6 of an automobile. There is shown upon this dash an indicator 7, and there is also shown the bellows diaphragm 8, which at the outset it will be said, may be enclosed in any suitable casing forming a part of the indicator or otherwise, and so arranged that its expansion and contraction will, through suitable mechanism communicating the reciprocatory movement of the diaphragm, and convert that movement if necessary, to a suitable dial or indicator readily visible from the driver's seat.

The elbow 3 is provided with a nipple 9 threaded internally for the reception of a vent plug 10, the purpose of which will presently be described. This elbow at its

lower end is threaded into a boss 11 of the top 12 of the gasoline tube 13. This top is preferably provided with a flange 14 which overlies slightly the annular flange 15 of a rim 16 soldered or otherwise attached to the upper side of the tank 1, as shown best in Fig. 2. Over the top of the cover 12 is placed an annulus 17 threaded to the rim 16, as indicated at 18. The tube contains near its top a conical baffle 19 provided with a central orifice 20. This baffle prevents surges of gasoline to the top of the tube, and thereby prevents gasoline from passing into the capillary system.

Threaded into the bottom of the tube is a ring 21, having a comparatively large central opening 22 covered by a disk of membraneous material 23, or material that will allow gasoline to pass through, but not air when used under conditions present in the gauge, preferably chamois, which material by experiment, I have found admirably adapted to my purpose. This disk is held to the ring by a metallic annulus or ring 24, and may be so held by the screws 25 shown, or by any other convenient means.

As shown in Fig. 4, there is a rack 26 indicated. However, it will be understood, as before intimated, that in this figure, both the diaphragm and the rack are in practice remote from the tank, and the rack may be an element cooperating with suitable gears and pinions of an indicator mechanism, to indicate to the driver the level of the gasoline in the tank.

It is my purpose to reduce the air space in the top of the gasoline tube to the minimum, and I may employ at the top of the tube, as shown in Fig. 2, below the cover 12, a filling or plug of cork or other suitable material 27, or the cover 12 may be made thicker and heavier so that it may be threaded down into the top of the tube.

As a final dampener to surges in the air column before it is led to the bellows, I provide a small orifice 28, which as shown is located just in front of the bellows.

In the modification, Fig. 5, the bottom of the gasoline tube is fitted with a cap 28′ provided with the central opening 29, and in this construction the membraneous disk 23 is held to the cap by screws 30 passing through a ring 31.

In operation, the vent plug 10 is removed and the tank 1 filled to its regular capacity. Under these conditions, not only will the tank be filled to the top, but the gasoline will rise in the tube 13 to the same level. The indicator mechanism is then adjusted to the point on the dial or drum, as the case may be, so as to indicate the quantity in gallons of gasoline in the tank. Next, this mechanism is locked in adjusted position. Then the plug 10 is reinserted. With the tank and tube thus arranged, any decrease in the quantity of fluid in tank 1 will tend to lower the level of the liquid in the gasoline tube 13, but since this tube does not communicate freely with the air, in fact, the whole system being hermetically sealed, the change in level in the tube will be comparatively slight. However, with the proper positioning of the indicating instrument at the outset, the suction produced in this manner will show by the position of the indicator the quantity of gasoline remaining in the tank. The relative positions of the gasoline in the tank and in the gasoline tube are somewhat as indicated in Figs. 3 and 4. If now all of the gasoline be used out of the tank except that which is in the tube, the gasoline in the tube will not flow out because of the vacuum or suction conditions that prevail, which will maintain the column in the gasoline tube regardless of the level of the gas in the tank. These variations of suction pressure or vacuum, expand and contract according to the stages of the operations, the diaphragm 8, and there being attached to the front of the diaphragm a rod having connection with the indicator mechanism, the variations of compression or contraction and expansion of the units of the bellows, will be communicated to the indicator mechanism. This mechanism may be substantially as shown in my copending application referred to hereinbefore, but since no claim herein is made to any particular indicator mechanism, it has not been deemed necessary to illustrate such a mechanism, for obviously those skilled in the art will readily perceive the mode of operation.

Depending to some extent upon the size of the tank and the size of the gasoline tube, the gasoline tube may be resorted to in an emergency for an additional small amount of gasoline. In order, however, that the supply in the tube may become available, it will, of course, be necessary to vent the system by removal of the plug 10 when conditions of atmospheric pressure will prevail throughout the system, and all of the gasoline contained in the gasoline tube will flow out of the opening in the bottom thereof into the tank, from which place it is conveyed in the usual manner to the engine.

The term "pressure" where used means in the present case, a suction pressure, and is used in the absence of a better and more accurate term, but as explained hereinbefore, it is the suction in the capillary system due to the varying level of the gasoline in the gasoline tube, that is depended upon in the main for actuating the bellows diaphragm through suitable mechanism to indicate the gasoline level in the tank. Obviously, after the first filling of the tank, it is not necessary or desirable to vent the system upon future fillings, and as before intimated, this vent-

ing of the system is only necessary upon the first filling, or in case that the gasoline in the gasoline tube is desired as an emergency supply.

Claims.

1. In a liquid level gauge, the combination with a liquid tank, of a tube extending into said tank from the top to a point adjacent the bottom thereof, and having an opening in its lower end, a pressure responsive indicator, a liquid-free capillary tube connecting said indicator with the first mentioned tube, both of said tubes being hermetically sealed from the atmosphere when the tank is emptying, and means for temporarily venting the first mentioned tube so that the tank and tube, in the first instance, can be filled to the same level under atmospheric pressure, the closing of said vent permitting the emptying of the tank without substantially lowering the level of the liquid in the said first mentioned tube, whereby, as the level of the liquid falls in the tank, the indicator will be operated continuously, through the capillary tube, to indicate the quantity of the liquid in the tank.

2. In a liquid level gauge, the combination with a liquid tank, of a gasoline tube extending vertically from the top to a point adjacent the bottom thereof, and having an opening in its lower end closed by a member of membraneous material designed to permit passage of the gasoline between the tube and tank to change the height of the liquid in said tube, a vacuum responsive indicator, a liquid-free capillary tube connecting the indicator with the first mentioned tube, wherethrough the indicator is operated, upon the variation of the height of the liquid in the gasoline tube, and means for temporarily venting said gasoline tube when the tank is being filled in the first instance, to permit said tube and tank to be filled simultaneously, under atmospheric pressure.

3. In a liquid level gauge, the combination with a liquid tank, of a gasoline tube extending from the top to a point adjacent the bottom of said tank, said tube being provided with a vented baffle in its upper end, and having an opening in its lower end closed by a member of membraneous material designed to permit passage of the gasoline between the tube and tank to change the height of the liquid in the tube, a pressure responsive indicator, a liquid-free capillary tube connecting the indicator with the first mentioned tube, wherethrough the indicator is operated upon the variation of the height of the liquid in the gasoline tube, and means for temporarily venting said gasoline tube when the tank is being filled, in the first instance, to permit said tube and tank to be filled simultaneously under atmospheric pressure.

4. The method of installing a fluid pressure actuated gauge including a liquid tube having at its upper end a closable vent to the atmosphere and a capillary connection to a pressure responsive gauge, which method consists in placing the liquid tube in a vessel, filling the vessel and tube simultaneously, under atmospheric pressure while the vent of the tube is open, and then closing the vent whereby the gauge is adapted to be operated continuously thereafter.

In testimony whereof I affix my signature.

KENNETH HALL KIEFER.