July 27, 1943. C. F. PYE 2,325,274

TANK FILLING DEVICE

Filed Oct. 20, 1939 2 Sheets-Sheet 1

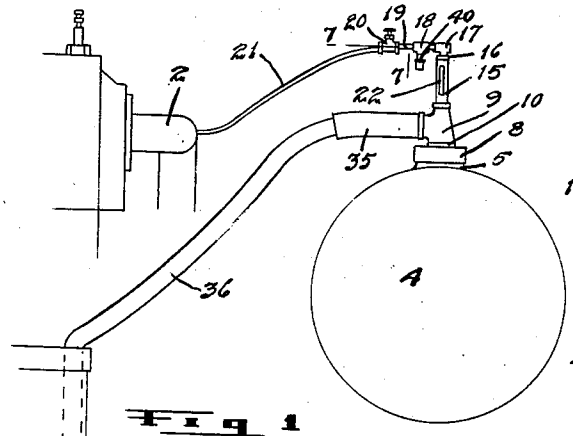


Fig 1

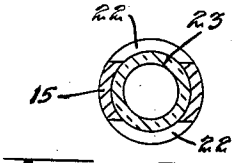


Fig 3

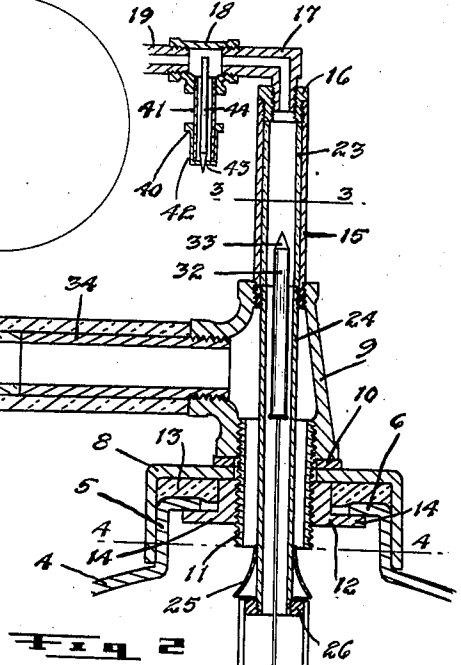


Fig 2

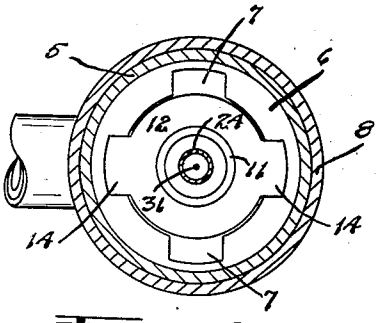


Fig 4

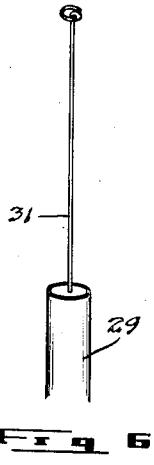


Fig 6

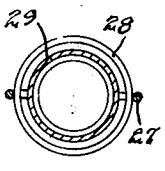


Fig 5

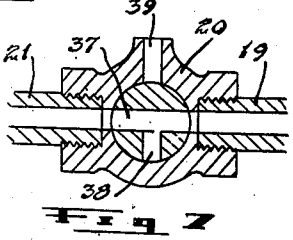
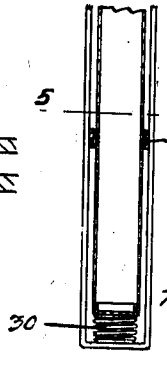


Fig 7



Inventor
C. F. Pye
Myron B. Stevens
ATTORNEY

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TANK FILLING DEVICE

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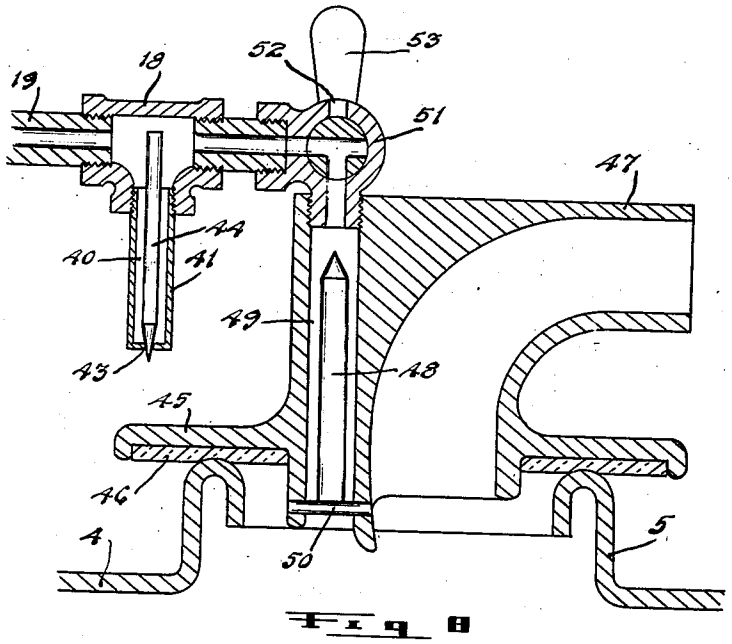


Fig 8

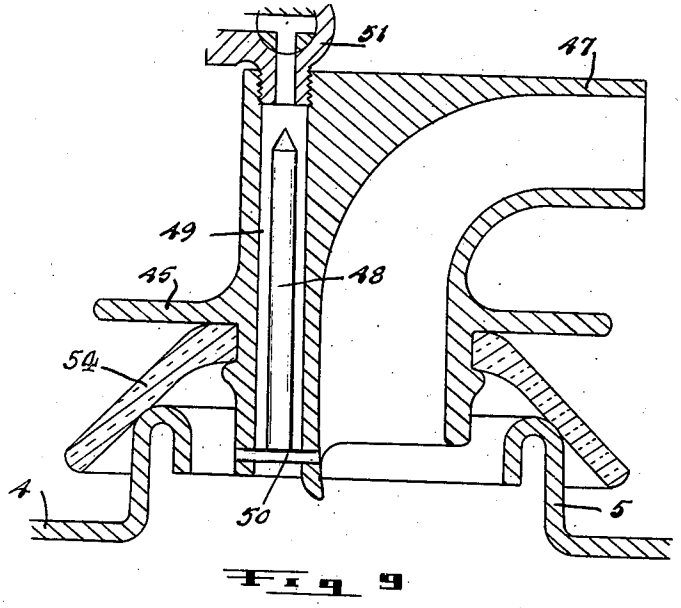


Fig 9

Inventor

C. F. Pye

Myron B. Stevens

Attorney

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UNITED STATES PATENT OFFICE

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TANK FILLING DEVICE

Carl Fraser Pye, Winnipeg, Manitoba, Canada

Application October 20, 1939, Serial No. 300,460

4 Claims. (Cl. 226—116)

The development of the internal combustion motor has resulted in a tremendous advance in machinery for various types of work. This is especially true on the farm where tractors, combines, threshing machinery and the like have been brought to a high state of perfection by its use. In the design of much of this machinery, it has been found necessary to place the motor in an elevated position and accordingly, the fuel for same must be elevated to the supply tanks.

Obviously, to manually carry such fuel up frequently results in spilling which forms a fire hazard. Very often such spilled fuel falls on the ignition wires and spark plugs causing considerable trouble while it also affords a base for dust and dirt to collect on. Foreign material may be blown into the fuel by the wind and the filling operation at the elevated position is usually awkward. It is not only a time consuming operation but tiring on the individual doing it. All of the above is made even more difficult if the filling must be done at night which frequently happens in the harvest time.

While the above remarks are directed to motor fuel and farm work, it will be easily understood that other liquids present the same difficulties and such difficulties occur in widely different locations and other branches of industry.

The present invention is a radical improvement over my former application for Tank filling devices filed April 28, 1939, under Serial Number 270,629 which has matured into Patent No. 2,225,844 issued December 24, 1940.

The principal object of the present invention is the same as my former application namely; to provide a valve which may be temporarily or permanently attached to the filler member of an elevated tank and by utilizing the low pressure developed in an internal combustion motor, through a pipe to said valve, liquid may be drawn up into said elevated tank through a secondary pipe from a lower container.

Further similar objects are; to prevent waste, spilling or contamination of the liquid and so eliminate fire hazards or injury to the mechanical parts of the motor, no alterations will be required in the tank or motor nor will the operations of same be interfered with.

A further object of the present invention is to obtain the above advantages by simpler, cheaper and more efficient means and said means may be shipped in a compact size and may be quickly assembled by the average individual without the use of special tools.

A further object is to provide a visible indicator for registering the quantity of liquid in the elevated tank at all times and registering on a small range.

A further object is to provide an automatic, quick, positive acting shut-off for the suction pipe to the motor which will operate when the elevated tank is filled to the required level.

A still further object of the invention is to provide a safety device to prevent the collapse of the elevated tank should the interior pressure thereof drop below a pre-determined setting.

With the above important and other minor objects in view which will become more apparent as the description proceeds, the invention consists in the arrangement and construction of parts hereinafter more particularly described, reference being had to the accompanying drawings in which:

Figure 1 is a diagrammatic view of the assembly.

Figure 2 is an enlarged vertical sectional view through the invention and partly showing the elevated tank.

Figure 3 is an enlarged horizontal section taken on the line 3—3, Figure 2.

Figure 4 is an inverted horizontal section taken on the line 4—4, Figure 2.

Figure 5 is a horizontal section taken on the line 5—5, Figure 2.

Figure 6 is a perspective view showing the shape of the push wire on the upper end of the float.

Figure 7 is a horizontal section on an enlarged scale through the shut-off valve and on the line 7—7, Fig. 1.

Figure 8 is a vertical sectional view showing a cheap modified form of the invention.

Figure 9 is a further modification of Figure 8.

In the drawings, like characters of reference indicate corresponding parts in the several figures.

A portion of an internal combustion motor is indicated by the numeral 1, having an intake manifold 2. A tank, containing liquid to be elevated, is indicated at 3. An elevated tank for receiving liquid is indicated at 4 and is provided with an upper extension 5, having the edges thereof rolled over to provide an inner ledge 6 which encircles an opening through which the tank is filled. At diametrically opposite sides, the ledge 6 is provided with cut-outs 7 for the locking members of the ordinary cap (not shown) to pass through. The device comprising the invention will now be described.

An inverted cup shaped member 8 telescopes over the extension 5 and is provided with a central opening. A reducer T 9 is positioned above the cup shaped member with a washer 10 therebetween. A nipple 11 is screwed into the lower end of the T and projects downward through the central opening in the member 8 and receives a lock nut 12 which fastens all of the above mentioned members together. A circular rubber washer 13 encircles the lock nut and spaces the upper part of the member 8 from the upper part of the extension 5. The lower part of the lock nut is provided with two diametrically opposite wings 14 which are shaped and designed to pass through the cut-outs 7, and upon being turned, to lock under the ledge 6 and hold all of the above parts to the extension.

The upper end of the reducer T 9 screw threadedly receives a short pipe 15 having the upper end closed by a screw threaded cap 16. The cap, in turn, is tapped and threadedly receives an elbow 17, having the other end screwed into a T 18. The opposite end of the T is fluidly connected, through a nipple 19, with a valve 20, which in turn, is connected through a pipe 21 with the intake manifold 2.

From the above it will be apparent that, when the motor is running, and the valve 20 is open, there will be a reduced pressure from the motor to the interior of the short pipe 15.

The central part of the short pipe 15 is cut away at either side, as shown in Figure 3, to form sight openings 22. The interior of the pipe receives a glass tube 23 which abuts, through a suitable gasket, the lower part of the cap 16. A pipe 24 screws into the lower end of the pipe 15 and, through a suitable gasket, holds the glass tube firmly and air tightly therewithin. The lower end of the pipe 24 slidably receives a downwardly flared member 25 and the end of the pipe screw threads into a nut 26. A U shaped wire 27 extends down into the tank 4 and the upper ends of the U are soldered or otherwise fastened to opposite sides of the nut 26. At suitable intervals along the U shaped wire, rings 28 are inserted and soldered to space and re-enforce the wire and also retain a tubular float 29 which is supported on a spring 30 from the bottom of the U. The upper end of the float is fastened to a central upwardly extending wire 31, the upper end of which terminates in a horizontal ring to support an aluminum pin 32 having the upper end sharpened to a point 33.

When the tank 4 is empty, the weight of the pin 32, wire 31 and float 29 are supported by the spring 30 and the point 33 of the pin 32 is within the glass tube 23 and observable therethrough at the bottom of the sight openings 22. As the tank fills the float rises, releasing the spring tension and raising the pin 32 in relation to the sight openings until the tank is full, at which time the point of the pin will be level with the upper end of the sight openings. Accordingly, the point of the pin 32, in its position with the sight openings, will give a fair approximation of the amount of liquid in the tank.

A tube 34 is screw threaded into the side of the reducer T 9 and receives a short rubber hose 35 which extends some distance past the end of the tube 34. A smaller hose 36 is received within the hose 35 and abuts the end of the tube 34 to make an air tight connection. The opposite end of the hose 36 extends down into the tank 3 and by this means, a fluid connection is made between the tank 3 and the tank 4.

In operation, with the motor running and the various parts in the positions described, the valve 20 is turned on. The suction of the motor draws air from the hose 36, through the tank 4, up the pipe 24, to the intake manifold. The resulting low pressure in the parts mentioned causes the atmospheric air to force the liquid from the tank 3 up the hose 26, down the nipple 11 to spray over the flared member 25 into the tank 4. The flared member also prevents liquid from passing up the pipe 24 at this time. As the tank fills, the float rises, causing the pin 32 to rise, and when the level of the liquid reaches the bottom of the pipe 24, the sudden rush of liquid thereup causes the pin 32 to leave the wire 31 and the point thereof enters and closes off the opening in the elbow 17, thus shutting off the suction from the tank 4.

In order to bring the tank 4 back to atmospheric pressure, the valve 20 is turned. A detail of this valve is shown in Figure 7 and it will be seen that the rotor portion is bored three ways to provide a passage 37 and a bi-passage 38. In the drawings the motor is sucking through the passage 37 but by turning the rotor in an anti-clockwise direction, the suction is disconnected and air can pass from the outside atmosphere, through a passage 39 in the valve casing, the passage 37 and the bi-passage 38 into the nipple 19 and so raise the air pressure above the pin 32. Accordingly, the pin drops and air will be admitted to the tank 4 therepast. Any liquid in the hose 36 will drain back to the tank 3.

Should any foreign matter enter the hose 36 and partially or fully plug same during the filling operation, the reduced pressure resulting in the tank 4 might collapse its walls. To avoid this a safety device 40 is provided. A nipple 41 is screwed into the lower connection of the T 18 and the lower end of the nipple is capped by a cup shaped member 42, having a small central hole 43 in the bottom. A pencil shaped plunger 44 is slidably mounted in the nipple 41 and the lower pointed end is received within the hole 43 to close same against the entrance of atmospheric air. Should the air pressure in the connections and tank 4 be reduced below a safe level, atmospheric air acting on the plunger will lift same and the resulting in-rush of air will maintain the pressure in the tank 4 at a safe level. Similarly, when the tank is full and the pin 32 shuts off the suction, the pencil shaped plunger 44 will rise and admit air to the intake manifold. The hole 43 is designed such that the in-rushing air therethrough creates an audible whistle which acts as an indicator to inform the operator that the tank is full or something has gone wrong.

From the above it will be seen that no alterations are required in the elevated tank or the motor. The float portion of the device will pass down into the tank through the filling opening thereof and the device can be sealed to the tank by the same means as the former cap. When shipping, the flared member 25 is slid up on the pipe 24 and the nut 26 is unscrewed therefrom to disconnect the float portion from the upper part. It can then be cartoned in two pieces of compact size. Celluloid or other transparent material may be substituted in place of the glass tube 23. Material of this nature, having many of the workable features of metal is now on the market and

could be substituted in place of the cut-away pipe 15, the glass tube 23 and the cap 16. A piece of this material could be bored to receive the pin 32 and the ends could be threaded and tapped to connect the reducer T 9 and the elbow 17. By this construction the pin 32 would be visible through the material from all radial directions with the added advantage of unbreakability.

The float 29 is made of metal and has considerable weight. When the tank is empty, this weight is supported by the spring 30. As the tank starts to fill the float becomes partly buoyant, rises slightly and proportionately releases the spring of the weight. When the tank is full the float 29, the wire 31 and the pin 32 are completely floated and supported by the liquid and the spring 30 is released of all pressure. By this system the pin 32 only moves a short distance in comparison with the distance the level of the liquid passes through from empty to a full tank and therefore, only a short glass 23 and short sight openings are required for visibly indicating the quantity of the liquid in the tank.

The modifications shown in Figures 8 and 9 embody the same principles in a cheap form. The float and indicator are dispensed with. In Figure 8 a flat base 45 is provided with a flat annular rubber gasket 46 therebelow. The hose 36 from the lower tank is connected to the extension 47. A pin 48, similar to the pin 32, is supported in a passage 49 by a cross pin 50. The upper end of the passage 49 is connected, through a valve 51, with the safety device 40 and a source of suction. A hole 52 is provided in the valve casing so that, when the valve is turned by the handle 53, the suction will be shut off and atmospheric air admitted.

In operation, the device is laid on the filler opening of the elevated tank with the gasket 46 resting thereon. The suction will then maintain it there. When the tank is full, the sudden rush of liquid up the passage 49 will lift the pin 48 and the point thereof will enter the hole in the valve 51 and accordingly, shut off the suction. When the valve is turned, atmospheric air enters the opening 52, the pin drops and the tank returns to atmospheric pressure. Most tanks are of a rectangular or oval shape. When the suction is operating thereon the tank walls move in giving a smaller capacity to the tank. When the tank returns to atmospheric pressure the walls return and this will lower the liquid level from the bottom of the passage 49 to a safe distance within the tank.

The form shown in Figure 9 is the same as Figure 8 with the exception that a cone shaped gasket 54 is used. This would centre the device on the filler opening and the suction would have a tendency to more or less wrap the gasket around the walls of the filler opening insuring a tight contact.

What I claim as my invention is:

1. In a tank filling device having a source of suction connected through an elevated tank to a lower liquid filled tank to elevate said liquid to said elevated tank: a float mounted for up-down movement in said elevated tank from said device; a chamber fluidly connected to said elevated tank, forming part of said suction connection thereto and having a restricted outlet therefrom; a pin slidably mounted in said chamber and adapted to close said restricted outlet upon being moved therealong; said pin supported by said float; said pin weighing sufficient to be normally unaffected by vapor passing thereby and moveable away from said float support to close said restricted outlet and shut off said source of suction by the impact pressure of sucked liquid into said chamber.

2. In a tank filling device having a source of suction connected through an elevated tank to a lower liquid filled tank to elevate said liquid to said elevated tank: a float mounted for up-down movement in said elevated tank from said device; a chamber fluidly connected to said elevated tank, forming part of said suction connection thereto and having a restricted outlet; a pin slidably mounted in said chamber and adapted to close said outlet and shut off said source of suction upon being moved along said chamber; said pin supported by said float; said pin being of a weight to be normally unaffected when vapor is passing thereby and moveable away from said float support to close said outlet and shut off said suction by the impact pressure of sucked liquid into said chamber; and means for admitting atmospheric air into said suction connection upon a pre-determined reduced pressure obtaining in said suction connection.

3. In a tank filling device having a source of suction connected through an elevated tank to a lower liquid filled tank to elevate said liquid to said elevated tank: a member suspended in said elevated tank from said filling device; a float moveably carried by said member and partly supported therebelow by a spring; a chamber forming part of said suction connection between said elevated tank and said source of suction and provided with a restricted outlet; a slidably mounted pin located in said chamber and adapted to close said outlet and shut off said source of suction from said chamber upon being moved therealong; said pin resting on and supported by said float and visible through a transparent area of said chamber; said float adapted to move upwardly upon said tank being filled with liquid and partly immersing said float and progressively release said spring from its weight as said tank is filling; said pin being of a weight sufficient to be moveably unaffected by the pressure of passing vapor and moveable away from said float support to close said restricted outlet and shut off said suction by the impact pressure of sucked liquid into said chamber.

4. In a tank filling device having a source of suction connected through an elevated tank to a lower liquid filled tank to elevate said liquid to said elevated tank: a member suspended in said elevated tank from said filling device; a float moveably carried by said member; a slidably mounted pin located in a chamber fluidly connected to said elevated tank and forming part of said suction connection thereto; said pin adapted to shut off said source of suction from said chamber upon being moved therealong; said pin resting on and supported by said float and visible through a transparent area of said chamber; said pin being normally unaffected by said suction when vapor is passing thereby; said pin being moveable, away from said float support, to shut off said suction upon a sudden rush of liquid into said chamber; means for admitting atmospheric air into said suction connection to create an audible noise upon a pre-determined reduced pressure obtaining in said suction connection; and manual means for shutting off said source of suction from said device and admitting atmospheric air to said elevated tank.

CARL FRASER PYE.