Oct. 28, 1952 T. C. SMITH 2,615,336

INDICATING DEVICE FOR CLOSED TANKS

Filed Sept. 30, 1949 2 SHEETS—SHEET 1

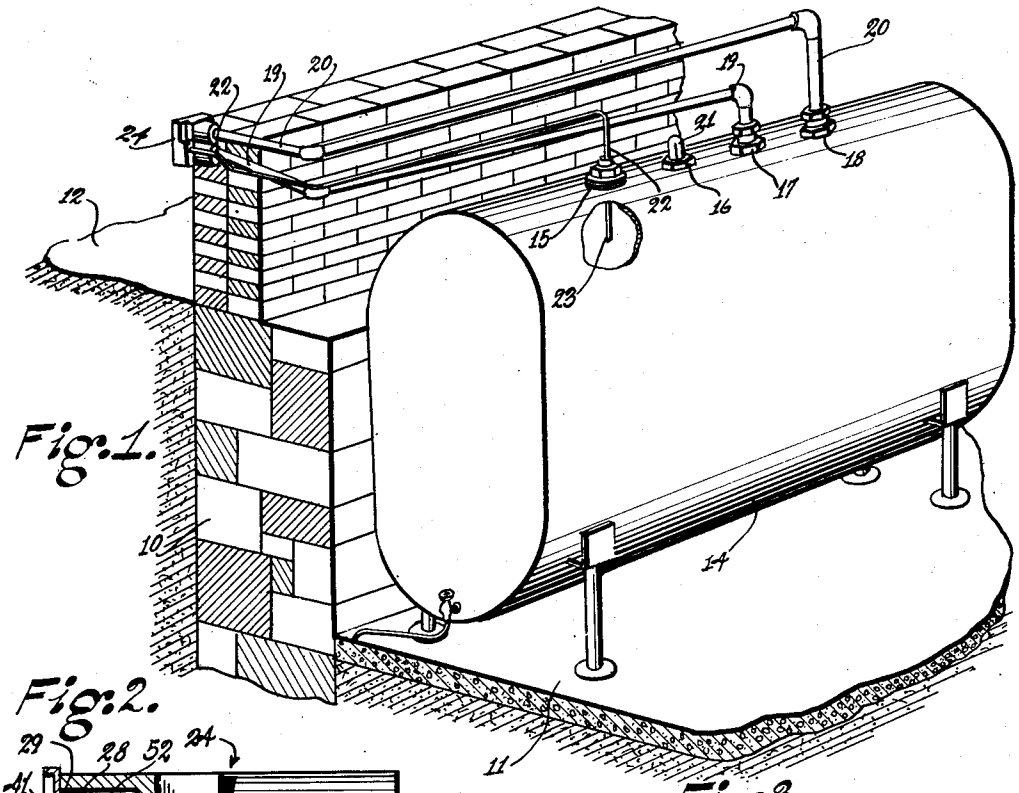


Fig. 1.

Fig. 2.

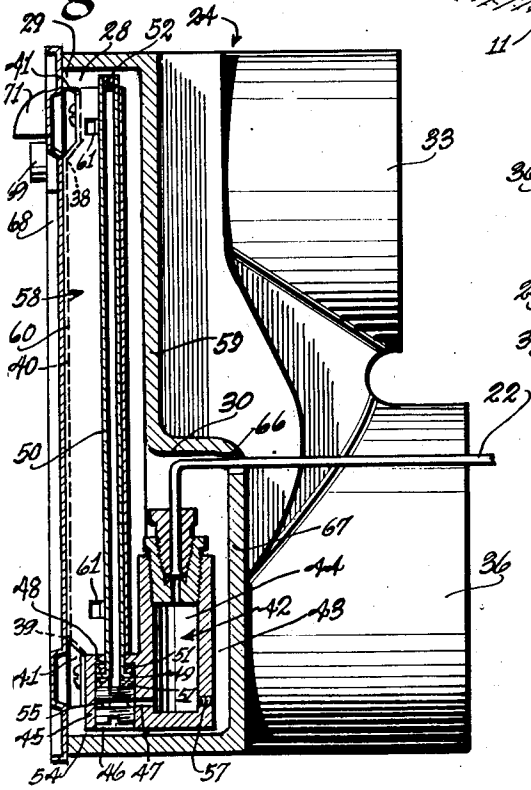
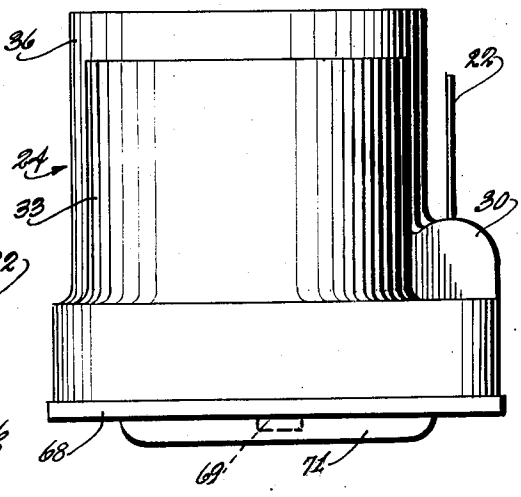


Fig. 3.



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Fig. 4.

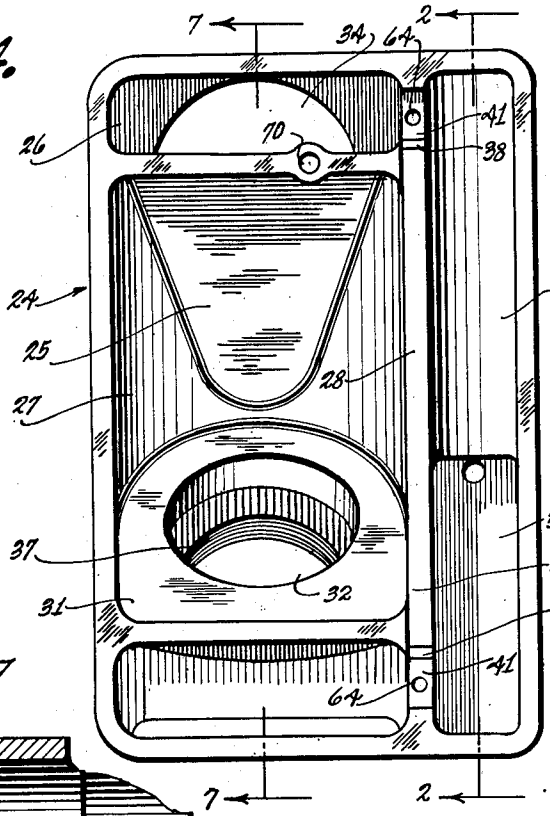


Fig. 6.



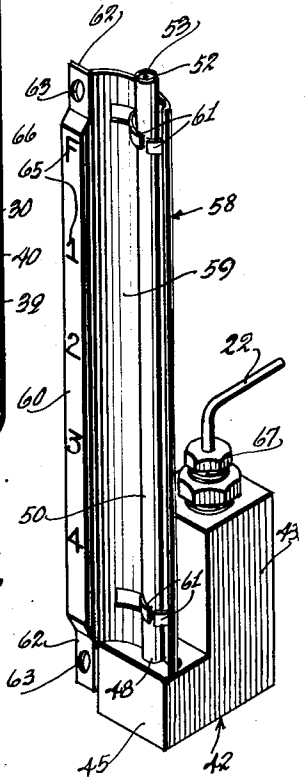


Fig. 5.

Fig. 7

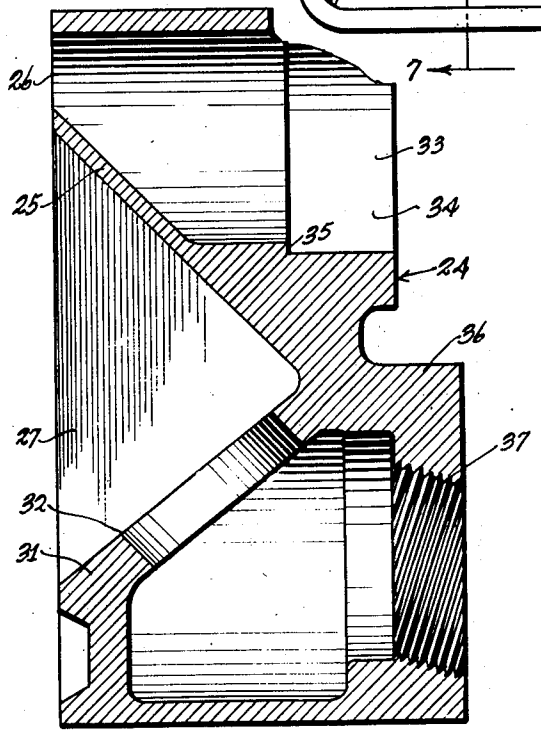
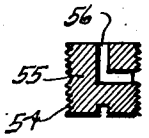


Fig. 8.



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INDICATING DEVICE FOR CLOSED TANKS

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Application September 30, 1949, Serial No. 118,897

1 Claim. (Cl. 73—299)

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My invention relates to a new and useful signaling device for closed tanks, especially the type that is operated by air forced out of a closed tank, such as used for the storage of oil in connection with oil burners, through a vent pipe, as the tank is being filled.

One object of the present invention is to utilize some of the features disclosed in my former patent, No. 2,309,804, dated February 2, 1943.

Another object of this invention is to produce a signaling or indicating device for a tank filling installation in which a box is provided to hold an indicating means and for connection with a filling pipe, a vent pipe and a relief pipe, the latter communicating with the indicating means, all combined as a unitary structure whereby the various elements are positioned in one single location and therefore function in unison to constitute a safety apparatus.

Another object of the invention is to provide a signaling or indicating device including signal means activated by a column of air flowing from the outlet end of a vent pipe.

Another object of the invention is to provide a signaling or indicating device having signal means operated by air flowing from or through a secondary vent or relief pipe. The advantage of such an arrangement is that there are no signal means parts to get out of order in the primary vent and interfere with the proper functioning of the latter.

Another object of this invention is to provide a signaling or indicating device including signal means comprising a visible fluid in a transparent tube connected with a relief pipe leading from a closed tank whereby air flowing through said relief pipe will cause an initial movement of the fluid to produce signals.

Another object of the invention is to provide a signaling or indicating device comprising the combination of a fill and vent box and a signal means, the latter being located within a portion of said box. For purposes of illustration a form of device is shown as comprising a fill and vent box with a chamber to receive the signal means, being a suitable type of hydrostatic gage, and said box also having separate fill and vent chambers which are closed to each other and the gage chamber when the front of the box is closed by a lid.

A further object of this invention is to provide a signaling device of the character mentioned comprising a fill and vent box and a signal unit detachably mounted in said box whereby a means for producing a signal may be installed at the same time the fill and vent box is put in place

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or said signal unit may be installed subsequently to the installation of the box.

A still further object of the present invention is to construct the fill and vent box with a rearwardly projecting tubular leg having an inclined threaded bore to accommodate the required pitch of a fill pipe for causing a free flow of liquid to a tank.

With the above and other objects in view this invention consists of the details of construction and combination of elements hereinafter set forth and then designated by the claim.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same I will describe its construction in detail referring by numerals to the accompanying drawing forming a part hereof, in which:

Fig. 1 is a perspective view of a closed oil tank installed in the basement of a building, illustrating a type of my signaling device connected by piping with the tank.

Fig. 2 is a section on the line 2—2 of Fig. 4.

Fig. 3 is a top end view thereof.

Fig. 4 is a front view of the fill and vent box with the lid or closure and signal means unit removed.

Fig. 5 is a perspective view of the signal unit.

Fig. 6 is an enlarged fragmentary longitudinal section of the upper part of the gage tube.

Fig. 7 is a section of the fill and vent box, forming a part of the signalling device, on the line 7—7 of Fig. 4, with a corner broken away.

Fig. 8 is a sectional view of the plug.

In carrying out the invention as herein embodied a part of the basement of a building is shown in Fig. 1 and includes an outer wall 10 with a floor 11 and the outside grade level is represented at 12. For purposes of illustration a tank 14 is shown within the basement and is provided with the usual four closure connections 15, 16, 17 and 18. In open communication with the tank is the fill pipe or line 19 joined with one of the connections, as 17. The vent pipe or line 20, which, for convenience of description, will hereinafter be referred to as the primary vent pipe, is joined to another of the connections, as 18. Any conventional depth gage 21 is mounted in a third one of the connections, as 16. The other closure connection 15 has a relief pipe or line 22 joined thereto and said relief pipe 22 has a nipple 23 of suitable length, for example, three or four inches, extending down into the tank and in communication with the interior of said tank and the secondary vent pipe 22.

A fill and vent box 24 is shown as being re-

cessed into the building wall above the grade level 12 so that access may be conveniently had thereto and the outer ends of all of the pipes are connected therewith as will be more fully set forth below.

The fill and vent box 24, is also shown in the enlarged views, Figs. 2, 3, 4 and 7, wherein the hollow of the box is divided by the inclined partition 25 into vent and fill compartments 26 and 27, respectively and a horizontal partition 28 separates said vent and fill compartments from a signal compartment 29 which is deeper or extends back farther at the lower end than at the upper end in the form of a wing 30.

The vent and fill compartments 26 and 27, respectively, open to the front of the box and the base wall 31 of the fill compartment is angularly arranged at approximately ninety degrees to the adjacent surface of the partition 25. In the base wall 31 is a threaded hole 32 to receive the usual auxiliary filling nipple in which the nozzle of a supply hose is inserted.

From the upper end of the rear of the box, or body thereof, projects a tubular arm 33 and into the smooth bore of said arm is inserted the outer end of a vent pipe preferably the primary vent pipe 20. Means to limit the telescoping movements of the vent pipe into said tubular arm is provided which may be a shoulder 35 formed on the interior of the arm. A tubular leg 36 projects rearwardly from the lower end at the rear of the box, or the body thereof. The tubular leg is of sufficient thickness to provide a downwardly and rearwardly inclined threaded bore 37. The outer end of the fill pipe 19 is screwed into the tubular leg to provide a liquid tight joint and the inclination of the bore permits said fill pipe to be connected to the box with the proper drop for the free flow of liquid towards the tank without the necessity of tilting the fill and vent box.

The forward edges of the top, bottom and side walls of the box, as well as the front edges of the partition 25 and the base wall 31 are all in the same plane but the major portion of the vertical partition 28 is slightly recessed between the points 38 and 39, Fig. 4, as indicated at 40, Fig. 2, and at each end of the recess 40 is a notch 41.

A signal means 42 of the indicator tube type comprises a hollow block 43 to provide a well or reservoir 44 open at the top and from the lower end of said block extends a forwardly projecting foot 45 having a cavity 46 in communication with the bottom of the well 44 through a duct 47. At the top of the foot 45 there is a round gage tube receiving hole 48 of smaller diameter than the cavity to provide an interior shoulder with which coacts the flared or flanged inner end 49 of the indicator tube 50. Resilient washers 51 of suitable material, cork for example, are mounted above and below the flared or flanged end of said indicator tube to provide a sealed joint and reduce to a minimum the chances of damage to the indicator tube.

The indicator tube 50 is produced from any suitable transparent material, glass for example, and is normally open at both ends. Preferably a small piece of rubber tubing 52, Fig. 6, is snugly fitted in the upper end of the indicator tube 50 so that a small vent orifice 53 is provided. When shipping the signal, a stopper (not shown), in the form of a solid rivet or suitable equivalent, is forced into the orifice 53 to completely seal the outer or upper end of the indicator tube 50.

In actual practice the cavity 46 in the foot 45 of the indicator block 43 is preferably formed

from the bottom of said foot and the walls thereof threaded to receive the apertured plug 54. This plug closes the bottom open end of the cavity 46 and has an annular exterior groove 55 adapted to coincide with the duct 47 when the plug 54 is in place. An angular hole 56, Fig. 8, extends through the plug 54 from the groove 55 to the inner or upper end of said plug which angular hole with the groove 55 and duct 47 provides the communication line between the well 44 and the cavity 46 or, actually, the indicator tube 50. For convenience, the duct 47 may be drilled from the rear of the indicator block 43 and the outer end of the drill hole closed by a plug 57, Fig. 2.

A scale plate 58 which also may function as a reflector has a transversely curved portion 59 and a straight side flange 60. The curved portion is positioned in back of the gage tube and secured to the gage block 42 in any suitable manner, as by soldering, welding or the use of attaching straps. The gage tube and scale plate may be connected to each other by straps 61 struck up from said scale plate. When the signal unit is mounted in the signal compartment 29 the straight side flange 60 will rest in the recess 40 of the partition 28 and said side flange has an offset 62 at each end to fit into the notches 41 for positioning the signal unit which is secured in place by fastening devices, such as screws, projected through holes 63 in the offsets and into threaded holes 64 in the bottoms of the notches 41.

A necessary quantity of a suitable liquid is contained within the well and the lower part of the gage tube to constitute signal means and function as a relief valve. The scale plate carries graduation marks 65 representative of inches from the top of the tank being filled and the high level mark when the tank is full. These graduation marks may be delineated on any suitable part of the signal unit although, by preference, they are placed on the side flange of the scale plate.

A relief pipe, 22 is connected to the upper end of the well 44 of the signal unit and since said relief pipe usually is a small bore copper tubing it can be readily bent to proper shape and projected through a hole 66 in the rear wall of the signal compartment wing 30. The outer end of the relief pipe 22 is attached to the signal unit block 43 at the upper end of the well 44 by means of any well known air tight connecter 67. When the complete device, or the signal unit separately is being shipped the relief pipe 22 is not attached and therefore a suitable stopper is placed in the bore of the connector 67 to prevent loss of the fluid in the signal unit. Such a stopper may comprise a soft solid rivet forced into the bore of the connector 67.

A cover, lid or closure 68 is disposed on the front of the box in engagement with the faced edges of the top, bottom and side walls of the box proper and the forward edges of the base wall 31 and partition 25 as well as the face of the side flange 60 of the scale plate. Thus the several compartments are positively separated from one another when the box is closed and, especially, the fill compartment is separated from the vent compartment which reduces to a minimum the chances of odors escaping into the vent compartment or dirt, dust, pieces of wood, stone or metal or gnats or other insects entering the fill compartment to, possibly, be washed into the tank at a subsequent filling and probably inter-

fering with the burner operation. The cover 68 is a detachably held in place by suitable means, such as an "Allen" screw 69, Figs. 2 and 3, projected through the cover and screwed into a threaded hole 70, Fig. 4, and at the upper end, so as to be opposite the vent compartment 26, is a louver 71 to provide a passageway from the discharge end of the relief pipe 22 to the atmosphere.

In order that the signal may be more visible during dark days and at night, the front face of that portion of the scale plate in back of the gage tube is covered with a coating of a luminous substance, particularly a substance which quickly absorbs light from an outside source and thereafter remains luminous for a considerable length of time, whereby the column of indicating fluid, which may include a color pigment for contrast, will be readily discernible in the gage tube. Usually it requires only fifteen or twenty minutes to fill the ordinary oil tank for a household oil burner and there are a number of substances which will remain luminous for approximately this length of time but should the luminous effect begin to fade before the filling operation is completed the coating may be reactivated by shining a flash light thereon.

When all of the parts are properly assembled and installed, and the signal or indicating unit can be installed at the same time as or at any subsequent time to the installation of the fill and vent box, and the tank is being filled, as the oil or other liquid reaches the lower end of the nipple 23, the air in the relief line 22 will be trapped. As the level of the liquid rises in the nipple the trapped air in the relief line 22 will cause the fluid in the signal or indicating means to rise.

The slightest initial movement of the fluid visible in the gage tube, caused by the oil level reaching the nipple 23, is the signal to discontinue supplying oil to the tank. Because the fill line between the fill and vent box and the storage tank is of considerable length, the oil in said fill line will continue to flow into the tank after the supply is shut off and therefore, the signal to discontinue filling the tank must be complied with. As the oil from the fill line flows into the tank the fluid in the gage tube will continue to rise so that, subsequent to the actuation of the signal, the level of the oil from the top of the tank is ascertainable by looking at the gage. After the lapse of a short period of time,

if the fluid in the gage tube has not reached the top of said tube, the operator can intermittently supply additional small amounts of oil until the tank is substantially full. As soon as the gage tube reaches the top any excess air in the relief pipe will be released through the orifice in the top of said gage tube because the gage functions as a relief valve.

With this type of signal, the person filling the tank does not have to depend upon hearing an audible signal above the sounds of the pump forcing the liquid from the supply tanker or street noises but merely watches for the rise of the fluid in the indicating tube which is located adjacent the fill compartment in the box near which he stands during the filling operations.

Of course I do not wish to be limited to the exact details of construction herein shown and described as these may be varied within the limits of the appended claim without departing from the spirit of my invention.

Having described my invention, what I claim as new and useful is:

A tank filling installation comprising an open front box having fill, vent and indicator compartments, a cover for the front of said box, the fill compartment having an opening at the rear for connection with the inlet end of a fill pipe, the vent compartment having an opening at the rear for connection with the outer end of a vent pipe, an indicator unit arranged in the indicator compartment, said unit being of the indicator tube type including a supply of indicating fluid, a relief pipe connected at one end to said indicator unit, the other end of said pipe being adapted to extend into the top portion of a closed tank to sense the approach of liquid therein to final full charge, whereby in filling said tank the initial rise of the indicator fluid will apprise the serviceman of the tank content.

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